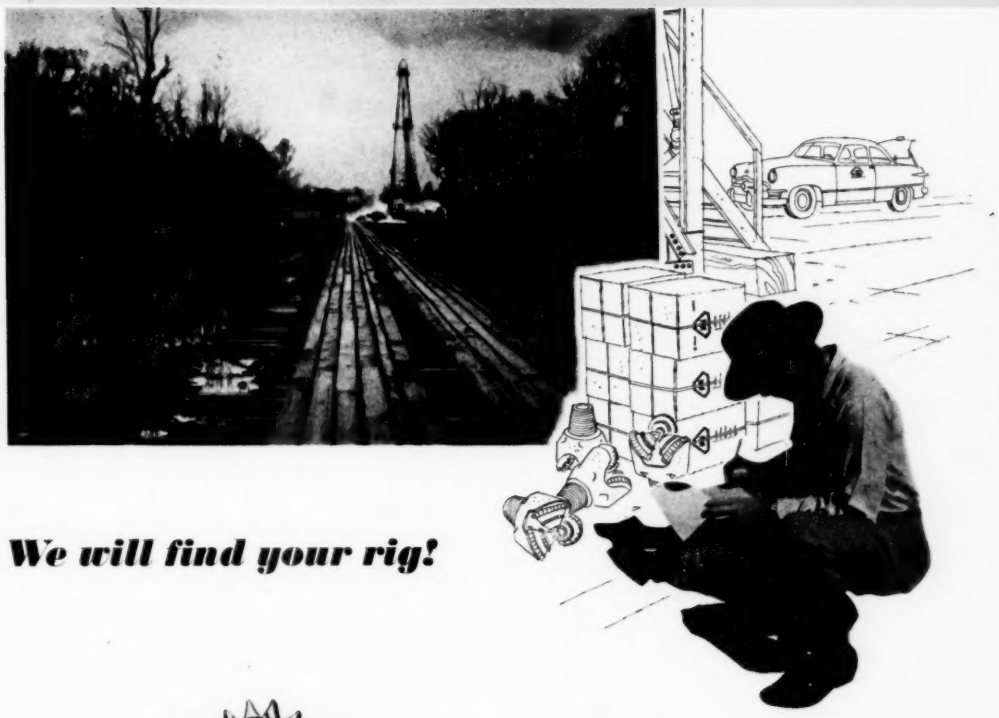
the OIL AND GAS JOURNAL



We will find your rig!

HUGHES
Tri-Cone
ROCK BITS

Your rig may be "off the beaten path" in its new location, but you can count on Hughes field men finding it. Their reputation for calling on more drilling rigs...more often ...is well earned!

They make it their business to consistently cover every active drilling area in the United States and Canada.

You'll find, too, that they can tell you the type of rock bit that will give you the fastest, most economical footage in the formations you are likely to encounter.

You can depend on an experienced Hughes representative to be on hand when you move into new territory, and to have the right rock bit on your rig at the right time.

PRICE 50 CENTS TABLE OF CONTENTS PAGE 77 **MAY 10, 1951**

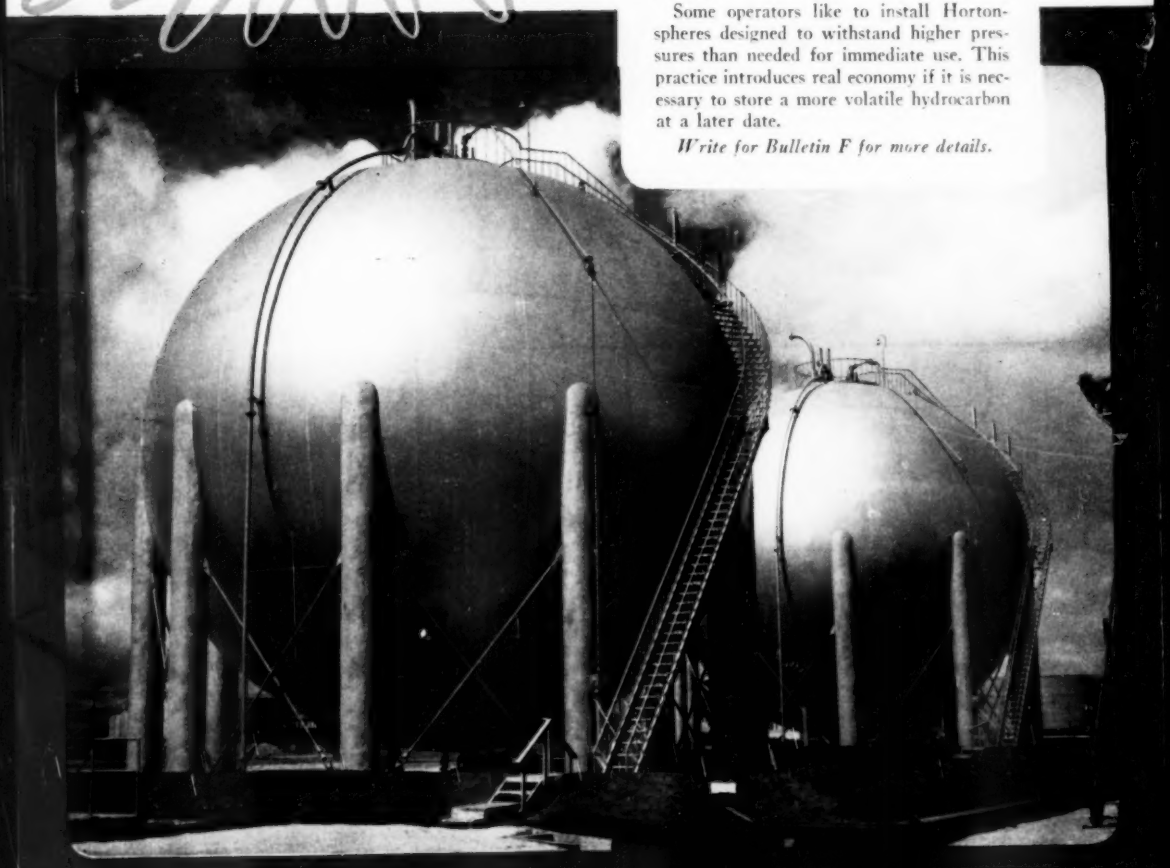
HORTONSPHERES

don't let volatile hydrocarbons escape

There's practically no loss when you select Hortonspheres for the storage of butane and other volatile hydrocarbons. These efficient containers are designed to resist internal pressures resulting from high volatility or pressure variations caused by daily temperature change. None of the contents escape through the vents as long as the internal pressure does not exceed the relief valve setting.

Some operators like to install Hortonspheres designed to withstand higher pressures than needed for immediate use. This practice introduces real economy if it is necessary to store a more volatile hydrocarbon at a later date.

Write for Bulletin F for more details.



CHICAGO BRIDGE & IRON COMPANY

What's the "BEST BUY" in Wire Rope ?

LET YOUR RECORDS TELL YOU!

The only way to determine a wire rope's value is to record the actual work it does . . . in terms of ton-miles, yards of rock moved, cars of coal hauled, etc. We'd like to have you keep such records on Bethlehem rope and any competitive ropes you may be using. Make a regular practice of it, so that you'll *know* how much each rope has done before it's scrapped.

At intervals, study these figures. They're your real yardstick of comparison. When you divide the purchase price of a rope by the total work it's done . . . expressed in tons, yards, or other units . . . the real cost of the rope becomes evident.

There's no truer method of determining today's best buy in wire rope. That's why we urge that you stack Bethlehem rope against the field and make your own comparisons—based on your own personal records.

Is there any better way of inviting you, the customer, to see for yourself? Is there any better, fairer way of laying our product right on the line?

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bingham

PRECISION BUILT FIELD PROVEN PUMPS

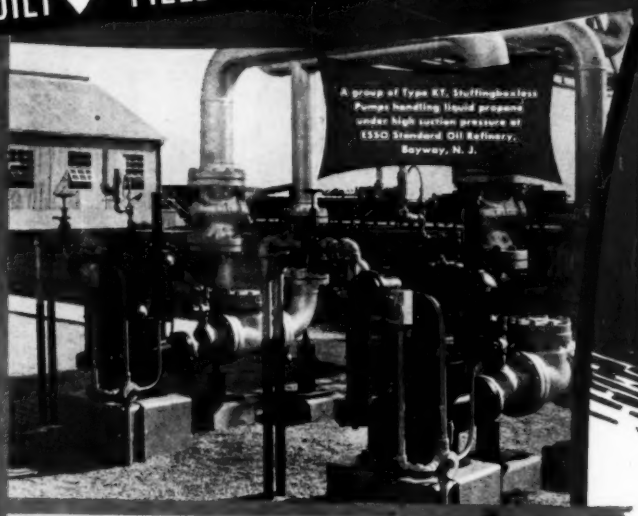
Stuffingboxless Pumps

Bingham Stuffingboxless Pumps are EXPLOSION PROOF and LEAK PROOF. This means SAFETY for plant personnel, PROTECTION against fire and PREVENTION against loss of valuable pumpage. These pumps can be furnished for any suction pressure...for any pumping temperature.

Bingham Stuffingboxless Pumps are especially adapted for and are giving exceptional service in many types of industry such as *Oil Refineries, Synthetic Rubber and Plastics industries, Natural Gasoline plants, Pipeline Booster stations, Terminal and Storage Tank Farms, Chemical plants, Food Processing industries, heavy construction and industrial applications.*

• • •

Bingham Stuffingboxless Pumps, like all Bingham products, are precision built in our new and modern plant. Each part is subjected to rigid inspection by expert craftsmen.

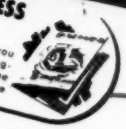


A group of Type KT, Stuffingboxless Pumps handling liquid propane under high suction pressure at ESSO Standard Oil Refinery, Bayway, N. J.

Section of Inspection Department in our new modern plant.

SEND NOW FOR STUFFINGBOXLESS FOLDER NO. 107

Lists 12 important reasons why you can profit by using Bingham Stuffingboxless Pumps. Write, write, or phone the Bingham Sales and Service office nearest you.



DOUBLE VOLUTE RADIAL BALANCE

Bingham PUMPS SINCE 1921

GENERAL OFFICES:
705 S.E. Main Street
Portland, Oregon

FACTORIES:
Portland, Oregon
Vancouver, Canada

Sales and Service Offices: BOSTON, MASS., 113 Broad Street • CHICAGO, ILL., 275 Old Colony Bldg., 407 South Dearborn Street • HOUSTON, TEX., 1206 Union National Bank Bldg. • MIDDLETON, OHIO, 505 Federal Savings & Loan Bldg. • NEW YORK CITY, N. Y., 611 Graybar Bldg., 420 Lexington Ave. • PITTSBURGH, PENN., 102 Mt. Lebanon Blvd. • SAN FRANCISCO, CALIF., 420 Market St. • SEATTLE, WASH., 316 Joseph Vance Bldg., 1402 Third Ave. • ST. LOUIS, MO., 2533 Salem • ST. PAUL, MINN., 205 South Robert St. • TULSA, OKLA., 200-206 N. Denver St. • VANCOUVER, CANADA, 3550 E. Broadway.

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommets by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

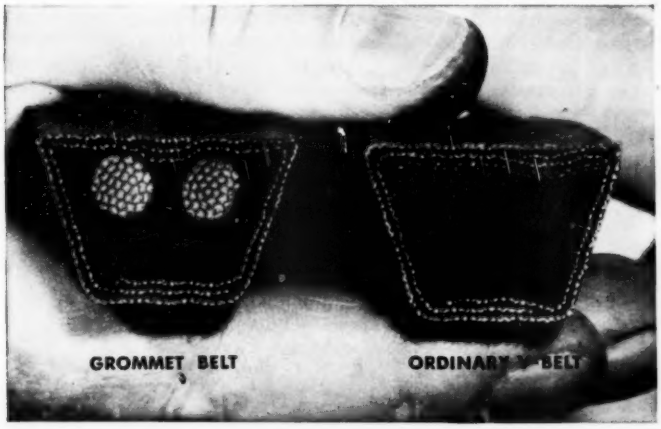
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. OJ-5
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

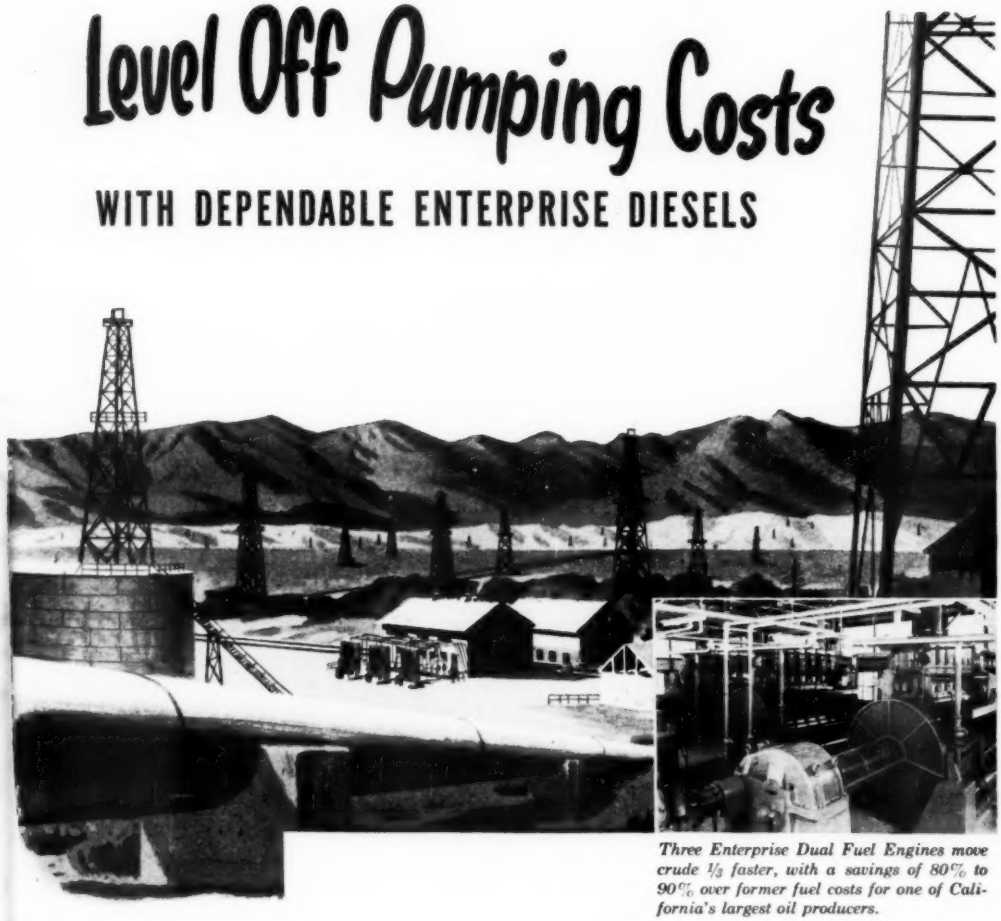
Street Address_____

City_____

State_____

Level Off Pumping Costs

WITH DEPENDABLE ENTERPRISE DIESELS



Three Enterprise Dual Fuel Engines move crude 1/3 faster, with a savings of 80% to 90% over former fuel costs for one of California's largest oil producers.

Enterprise Diesels, Dual-Fuel and Spark Ignition Gas Engines, stationary and portable, are built in a wide range of models from 68 to 1755 HP. Generator sets to 1250 KW. Turbocharging available on most models.

Rugged and reliable, Enterprise Diesels are designed and built to cut power costs all along the line—from drilling rig to pipe line terminal. Modern installations of these medium and slow speed diesels are providing exceptional pumping service on a continuous, round-the-clock basis. Contributing to their high economy of operation are 1) simplicity of connection and control, 2) high torque at all speeds, 3) elimination of transmission losses, 4) adaptability to crude and residual fuels, and 5) smooth, vibration-free operation—even under excessive load. They provide the flexibility that's needed, too, using Diesel oil, crude, natural gas or dual-fuel. For *your* next diesel power job, investigate Enterprise—better built for longer life at lower costs.

Enterprise
STATIONARY
Diesels

The Choice of Power Experts

ENTERPRISE ENGINE & MACHINERY CO.
A Subsidiary of General Metals Corporation
18th & Florida Streets, San Francisco 10, California
Offices in Principal Cities

Just Out!

NEW 36-PAGE EDITION OF

PIPING POINTERS

...a bigger, more helpful handbook for training maintenance workers

You asked for ¼ million copies of the last edition of Piping Pointers. You found it a big help in training beginners and refreshing veterans in your piping crews. The bigger and better edition is just out—changed in appearance but not in purpose. Crane again offers this booklet—to help keep your piping systems at peak efficiency.

Piping Pointers talks facts . . . not theory. Thoroughly covers the fundamentals of good, sound, everyday piping practices . . . in easy-to-grasp, nontechnical language. Its many "how-to-do-it" features are illustrated for easy understanding.

Mistakes in piping installation and maintenance cost more today. Piping Pointers can help your men avoid them. Just ask your Crane Representative for a copy.

PARTIAL INDEX TO PIPING POINTERS

HOW TO choose valves for every service . . . install valves . . . read reducing fittings . . . make up screwed joints . . . assemble flanged joints . . . make up solder joints . . . install pressure regulators . . . use vent and drain valves . . . avoid steam trap trouble . . . save on pipe joints and materials . . . handle piping tools.

plus THE CRANE VALVE SELECTION GUIDE which saves time and effort in selecting valves for common piping services.

PIPING POINTERS 16-mm SOUND FILM
Free Usage for Group Training
A 30-minute motion picture that dramatizes the fundamental information in the Piping Pointers Manual. Ideal for classroom or plant training groups. Available on request through your local Crane Branch.

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Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

SMOOTHER RUNNING?

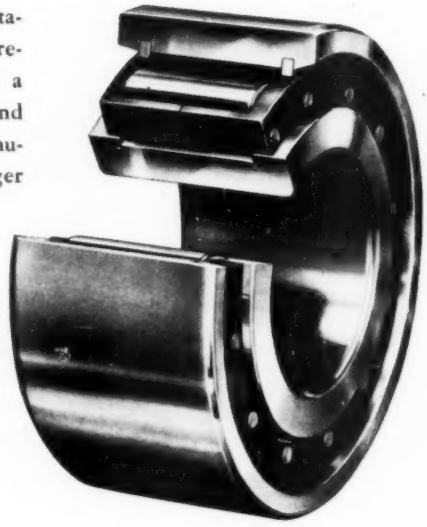
LOWER MAINTENANCE?

LONGER BEARING LIFE?

Yes!

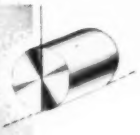
. . . because they're MADE RIGHT

Rollway's *right-angle* design promotes true orbital rotation of the rollers around the shaft. And Rollway's precision machining and rigorous inspection produce a bearing with a minimum of end-rub, side-shock and sliding friction of the rollers. Designed right—manufactured right—your Rollway bearings assure you longer wear, less down-time and lower maintenance cost.



ROLL the RIGHT Way with ROLLWAY

RIGHT-ANGLE
ROLLER ENDS, precisely square to avoid end-rub, oscillation and side-shock.



RIGHT-ANGLE
BEARING SURFACES with parallelism that results in unwavering rightline rolling.

RIGHT-ANGLE
SEPARATOR SLOTS accurately machined to prevent roller skew, slide and uneven wear.

Let's examine your bearing problems together to determine exactly the kind of bearings you need. Our years of specialized bearing experience, plus complete engineering and metallurgical services, are always at your command. No cost. No obligation. Just write or wire Rollway Bearing Co., Inc., Syracuse, N. Y.

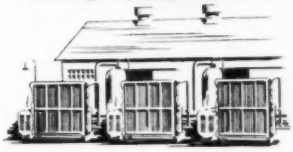
SALES OFFICES

Syracuse, Philadelphia, Boston, Pittsburgh, Cleveland, Detroit, Chicago, Houston, Los Angeles

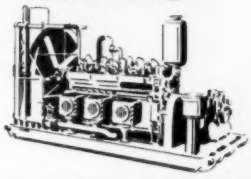
ROLLWAY BEARINGS

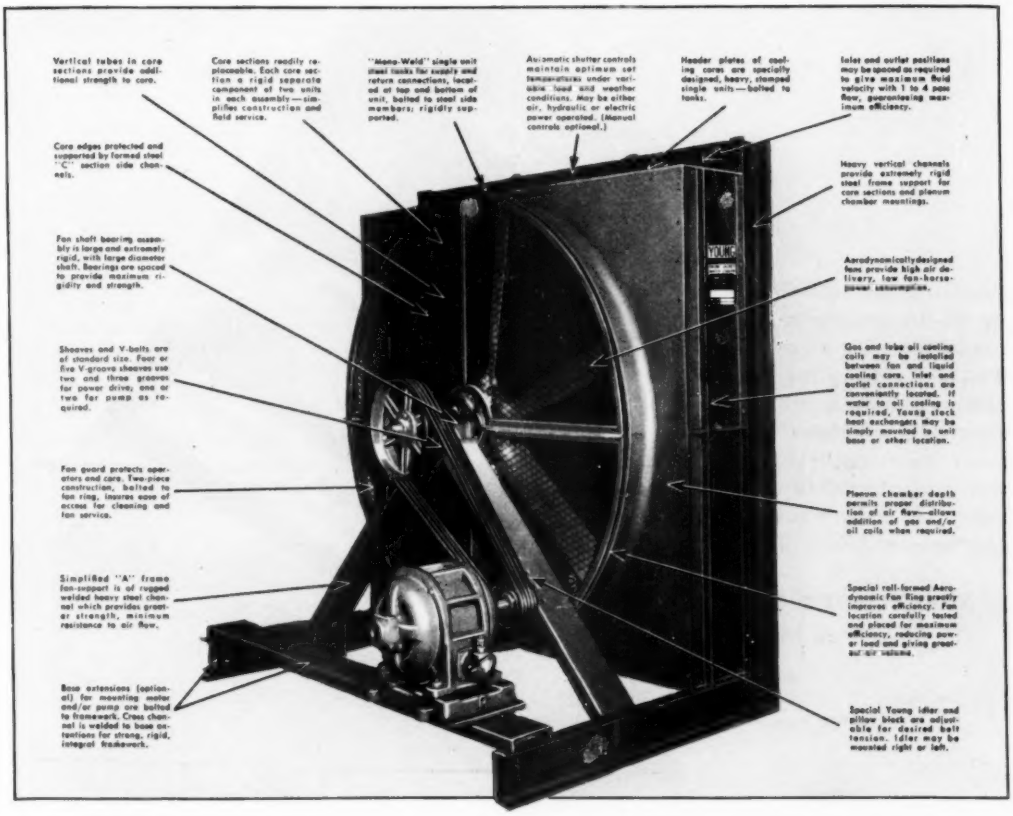
Complete Line of Radial and Thrust Cylindrical Roller Bearings

Presenting the New YOUNG Jacket Water Coolers



Greater cooling capacity...more compact, rugged design for gas, gasoline, Diesel engine applications . . . . .




Vertical tubes in core sections provide additional strength to core.
Core sections readily replaceable. Each core section a rigid separate component of two units in each assembly—simplifies construction and field service.
"Mono-Weld" single unit steel tanks for supply and return connections, located at top and bottom of unit, bolted to steel side members; rigidly supported.
Automatic shutter controls maintain optimum set temperatures under variable load and weather conditions. May be either air, hydraulic or electric power operated. (Manual controls optional.)
Header plates of cooling cores are specially designed, heavy, stamped single units—bolted to tanks.
Inlet and outlet positions may be spaced as required to give maximum fluid velocity with 1 to 4 pass flow, guaranteeing maximum efficiency.
Core edges protected and supported by formed steel "C" section side channels.
Heavy vertical channels provide extremely rigid steel frame support for core sections and plenum chamber mountings.
Fan shaft bearing assembly is large and extremely rigid, with large diameter shaft. Bearings are spaced to provide maximum rigidity and strength.
Aerodynamically designed fans provide high air delivery, low fan-horsepower consumption.
Sheaves and V-belts are of standard size. Four or five V-groove sheaves use two and three grooves for power drive; one or two for pump as required.
Gas and lube oil cooling coils may be installed between fan and liquid cooling core. Inlet and outlet connections are conveniently located. If water to oil cooling is required, Young stock heat exchangers may be simply mounted to unit base or other location.
Fan guard protects operators and core. Two-piece construction, bolted to fan ring, insures ease of access for cleaning and fan service.
Plenum chamber depth permits proper distribution of air flow—allows addition of gas and/or oil coils when required.
Simplified "A" frame fan-support is of rugged welded heavy steel channel which provides greater strength, minimum resistance to air flow.
Special roll-formed Aerodynamic Fan Ring greatly improves efficiency. Fan location carefully tested and placed for maximum efficiency, reducing power load and giving greatest air volume.
Base extensions (optional) for mounting motor and/or pump are bolted to framework. Cross channel is welded to base extensions for strong, rigid, integral framework.
Special Young idler and pillow block are adjustable for desired belt tension. Idler may be mounted right or left.

YOUNG

Heat Transfer Products for Automotive and Industrial Applications.

Young Quality

T. M. Reg. U.S. Pat. Off.

Heating, Cooling, Air Conditioning Products for Home and Industry.

YOUNG RADIATOR COMPANY

Dept. 201-E • RACINE, WISCONSIN

Factories at Racine, Wisconsin, and Mattoon, Illinois

OIL FIELD DISTRIBUTORS:

TULSA: J. R. Meek Company, 1341 S. Boston St., Rm. 109

LOS ANGELES: Flournoy & Everett Inc., 5043 Santa Fe Ave.

MUSKEGON: Harold J. Young, 206 Montgomery Bldg.

From the many features shown above, you can see that *extra ruggedness* is built into every component of improved Young Jacket Water Coolers. The result is a unit that will last the life of the power plant . . . one that excels in mobile service—that has the necessary compactness and ample capacity for field duty on portable equipment.

Young designing permits the addition of lube oil and/or gas cooling coils between the water cooling core and the fan, making possible a lower fan-horsepower requirement.

Catalog No. 1351 plus ratings, specifications and other details will be furnished upon request. See your nearest Young Distributor, or write direct.

ANNOUNCING
A BRAND NEW CATALOG
FOR BONNEY WELDOLETS

Contains complete and up-to-the-minute catalog information on all types of Weldolet welding fittings available. Presents a full range of sizes and schedules, introducing many new applications, together with simplified data on the determination of code requirements. To get your copy of this catalog, write . . .

BONNEY FORGE & TOOL WORKS
366 Green Street, Allentown, Pa.

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NATIONAL SUPPLY EXPORT CORP.
30 Rockefeller Plaza, N. Y.

WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

There's no substitute for making hole...

thats why

Joe Wyant selects MURPHY DIESEL POWER for his own rigs

AS drilling superintendent for other drillers, Joe Wyant of Guyman, Oaklahoma, had a chance to learn first hand how Murphy Diesels perform on drilling rigs. So it was natural for him to select a Murphy Diesel powered rig when he recently began contracting with his own equipment. A second rig added later was also Murphy powered.

If you want real performance on your rig, find out more about Murphy Diesel Power . . ask Murphy owners for their opinions and write for a copy of the booklet *"10 Questions to Ask a Diesel Engine Salesman."*

MURPHY DIESEL COMPANY
5305 W. Burnham St., Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH—Sales, Parts and Service:
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Heavy duty power
for the oilfields
Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 220 H.P. Generator Sets 60 to 133 K.W.

Or See Your Nearest Dealer

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Mt. Vernon, Illinois
Ed Meyer Tractor Co.

Jackson, Michigan
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What Day This Month Will Corrosion Knock Out Your Steam And Condensate Lines?

It can happen any day. *Corrosion* may be active in your plant *now*—in your steam and condensate lines, your process equipment—ready to destroy!

But whatever day failure occurs . . . you can be sure of one thing. It's going to be expensive! Many times more costly than *proper* corrective treatment.

Drew prevents corrosion by a study and investigation of *your* plant operations and water conditions. It analyzes those conditions in its modern laboratories and *insures* improvement of operation by specific recommendation for corrective treatment.

Thoroughness of investigation and proper treatment have made Drew one of America's fastest growing water treatment companies. Industry's most respected names avail themselves of Drew's Boiler Water Treatment and Steam Line Corrosion Control. Do the same. Consult the nearest Drew engineer or write for further information.

Have the Drew engineer check the corrosion in your plant with a corrosion tester.

Send for Technical Bulletin on Steam Line Corrosion Control. Write for your copy today.

POWER DREW CHEMICALS

Power Chemicals Division

E. F. DREW & CO., INC.

15 East 26th Street, New York 10, N. Y.

DREW PRODUCTS

Nationwide Service in Boiler Water and Cooling Water Conditioning

Sgt. Robert Chrisman levels a field at the eastern end of the Davison airstrip, Ft. Belvoir, Va., with a "Cat" D7 Tractor. In the background are four "Cat" No. 12 Motor Graders completing runway.

THE MILITARY GETS FIRST CALL

THESE "Caterpillar" earthmoving machines, working on the runway of the Davison airstrip at Ft. Belvoir, Va., show at a glance where a lot of "Cat" equipment is going these days. And that's how it's got to be.

Defense Rated Orders get first call as America's military establishment prepares for what may come. The urgent build-up of our power has meant drafting machines as well as men. An ever-increasing flow of "Caterpillar" equipment and parts is going to the support of America's fighting men and to defense projects.

This means that there already exists a scarcity of "Cat" equipment and engines for civilian use. So it is to *your* advantage to make the machines you now have *last*. You can keep them on the job longer by doing these things:

1 Follow sound and recommended operation and maintenance procedures to the letter. Read and reread your Operator's Instruction Book.

2 Make full use of your "Caterpillar" dealer's facilities for servicing and rebuilding machine parts.

3 Anticipate future parts needs, then contact your dealer and let him help. But *don't* buy or order parts you don't actually need.

Caterpillar Tractor Co. will do everything possible to maintain every "Caterpillar" machine in the field, to provide new machines as fast as possible, and to allocate them as fairly as possible.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

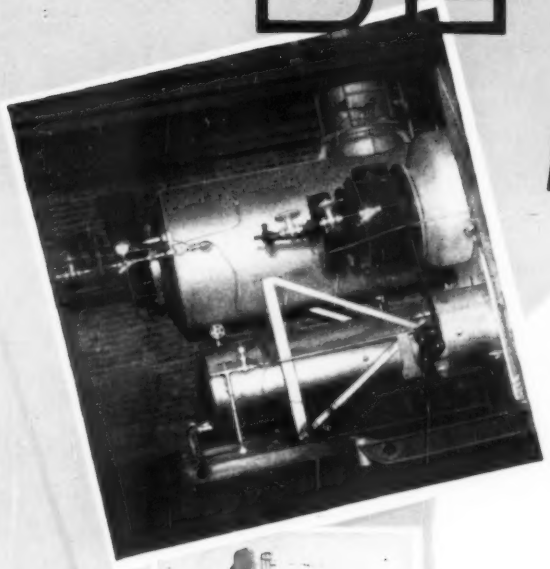
CATERPILLAR

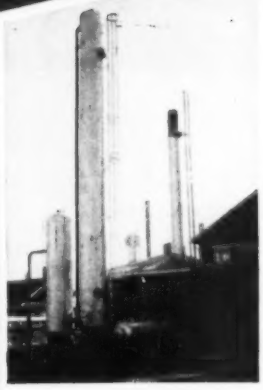
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

DE-SUL

BS&B Now Offers





Compact, easily serviced sorber and reboiler are shown above. Center view shows an overall view of an installation. A field installation, capable of continuous automatic operation with a minimum of attention, is shown below.

BS&B

BLACK,

FURIZE!

a Complete, Automatic, Low Cost Unit for "Sweetening" Gas

Make your sour gas wells pay you a profit! Meet transmission requirements with the new BS&B Desulfurizer! It will reduce the hydrogen sulfide content to one grain or less per 100 SCF.

Iron sulfide sedimentation and corrosion are reduced to a minimum by continuous filtering. Manually operated by-passes are built around liquid level controls and filter, allowing unit to operate during cleaning and repair. Field assembly is kept to a minimum with pre-fabricated piping and skid mounting of the regeneration unit.

A minimum of operating attention is required. Units are supplied with gas or electrically powered pumps, depending upon available utilities.

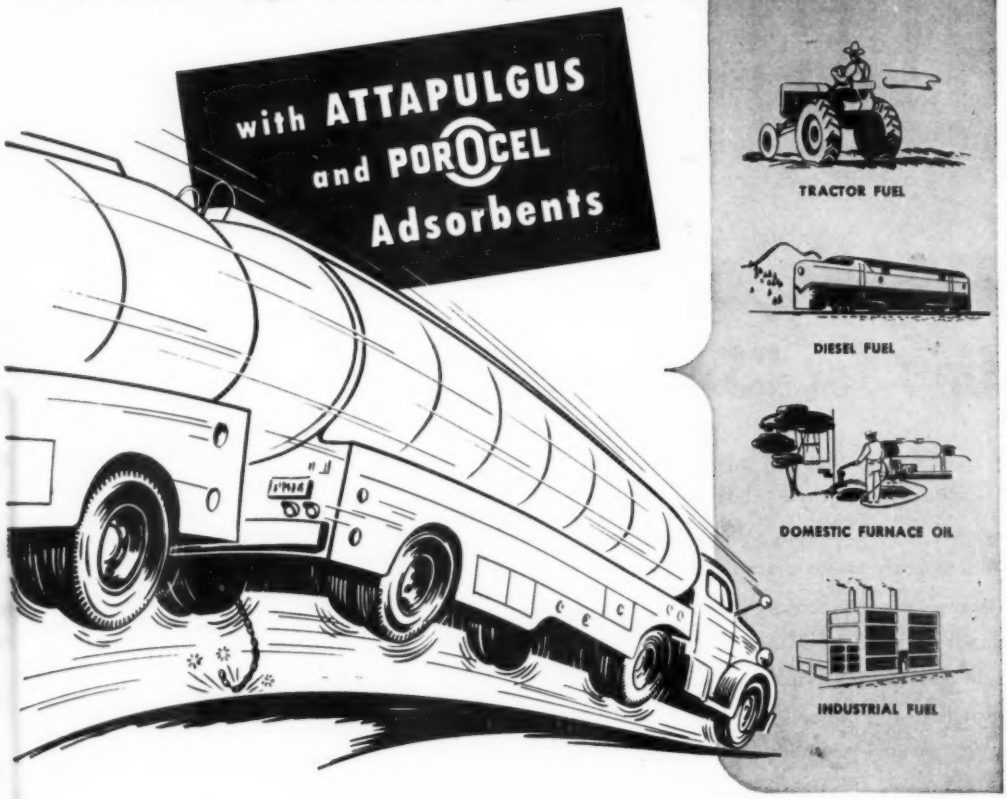
Units are shipped in three parts . . . sorber, still column, and reboiler-storage tank-pump. Governing factors in determining proper Desulfurizer size are hydrogen sulfide content, carbon dioxide content, gas pressure and temperature, quantity of gas and available utilities.

BS&B Desulfurizers are field tested and proved. They are backed by BS&B's 58 years' experience in oil and gas production and processing equipment. Write today for full particulars . . . or call in your nearest BS&B Man!

SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division **2131 Westwood Blvd., Room 7A, Oklahoma City, Okla.**

Gain an edge in the light fuel oil market . . .



In a highly competitive market for distillate fuel oils—Diesel, domestic furnace, tractor, industrial—the refiner who places emphasis on high quality in his products has a decided edge. In fact, selling strategy often is based on points of superiority that assume smaller stature at other times. This applies to other products too—absorption, enrichment, smudge, and insecticide spray oils.

A final straining step using Attapulgus Fullers Earth or Porocel Activated Bauxite is an economically attractive form of light fuel oil quality insurance. These adsorbents are recognized standards for the selective "polishing" of light distillates at low cost. Oils in this range can be filtered to high yields for removal of moisture and sediment. Removal of residual amounts of treating chemicals is accomplished. Moisture haze is removed; color improved or stabilized.

Attapulgus and Porocel adsorbents couple low price with long service life—an unbeatable combination when finishing distillates whose market price generally dictates a minimum of refining expense. Process equipment required is relatively simple and inexpensive—often built from on-site components.

Let's explore the possibilities of improving your position—hence profits—in the light fuel oil market. Our staff is at your service to help select the right adsorbent and the right conditions.

ATTAPULGUS CLAY COMPANY *Fullers Earth* · **POROCEL** CORPORATION *Activated Bauxites*

Dept. V, 210 West Washington Square, Philadelphia 5, Pa.

A new PB Service...

Fastest, easiest and simplest protector installation!

Field-proven rubber holds up under tough drilling conditions, deep drilling temperatures!

Relieved end design gives extra shock and tear resistance where it's needed most!

PB's own men provide a fully responsible field service.

PB PROTECTORS

CAN BE EASILY REMOVED FROM PIPE ON YOUR RACK

FOR RE-USE!

Only PB offers this specially engineered protector removal and re-installation. For full information on this new money-saving service, call . . .

Protection is our Business...!

PB OIL FIELD SPECIALTIES

Patterson-Ballagh

Division of Byron Jackson Co.

MAIN OFFICE: 1900 EAST 65TH STREET
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Los Angeles, Calif.	Alice, Texas	Houma, La.	Great Bend, Kan.*
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Ventura, Calif.	Dallas, Texas	Casper, Wyoming	EXPORT: Mexico City, Mexico
			Buenos Aires, Argentina

PATTERSON-BALLAGH

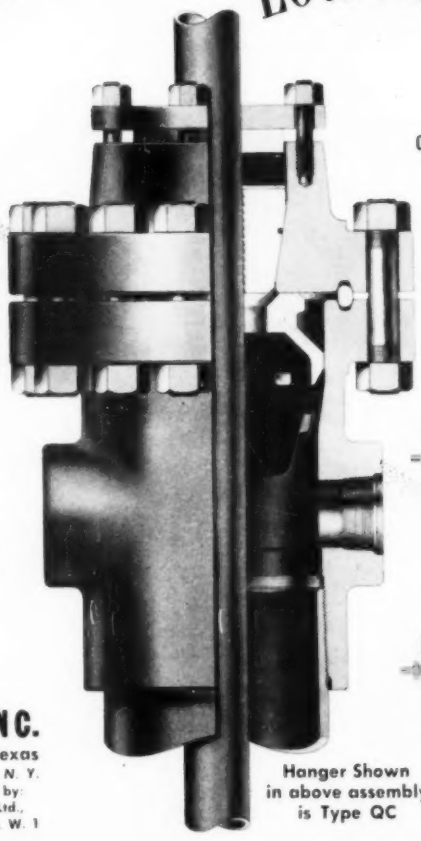
Cameron FORGED STEEL well head equipment

for low pressures

HIGH QUALITY LOW PRICE

Modern production methods at Cameron have made possible this fine forged steel **flanged** tubing head at a price comparable to that of the usual threaded top tubing and pumping heads. Having a standard API flanged top connection, this head eliminates the need for, as well as the cost of, an adapter when it is necessary to install a flanged valve or blowout preventer above.

Also furnished with lock screws when desired, a wide selection of tubing hangers and hanger-stripper combinations are available. In addition to the types of suspension shown here, any other style Cameron tubing hanger may be used. The heads are available in Series 400 API, 1000 lbs. W. P. and Series 600 API, 2000 lbs. W. P. models.



Hanger Shown in above assembly is Type QC

OPTIONAL HANGERS

Type BCQ

Type BC

Type BCB

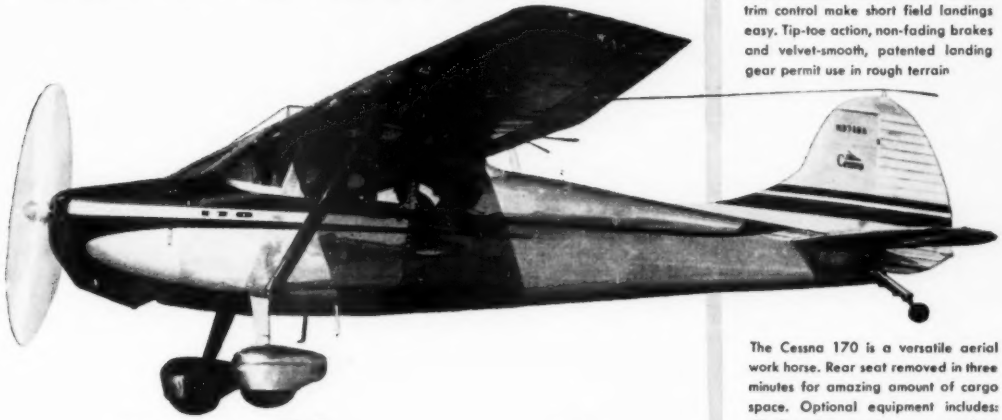
Cameron **IRON WORKS, INC.**

P. O. Box 1212 Houston, Texas

Export: 74 Trinity Place, New York, N. Y.

Represented in the sterling area by: British Oilfield Equipment Co., Ltd., Duke's Court, 32 Duke St., London, S. W. 1

Lowest Priced 4-PLACE, ALL-METAL PLANE ON THE MARKET TODAY



...by Several Thousand Dollars!

This Cessna 170* has four comfortable, adjustable foam rubber seats for long trips . . . plus ample luggage space.

Over 120 m.p.h. cruising speed, 500 mile range, over 15 mile per gallon economy. Simplified maintenance lowers inspection, upkeep costs.

Unique engine mount, spun glass insulation, improved door seal reduce noise, vibration—allow relaxed conversation.

Tapered semicantilever high-wing design gives stability, "big ship" feel, control responsiveness. Selective-action 50° flaps, excellent visibility and adjacent trim control make short field landings easy. Tip-toe action, non-fading brakes and velvet-smooth, patented landing gear permit use in rough terrain

The Cessna 170 is a versatile aerial work horse. Rear seat removed in three minutes for amazing amount of cargo space. Optional equipment includes: skis for winter service . . . seaplane floats for water operation . . . cross-wind wheels for single-strip all-wind conditions . . . stretcher for ambulance use . . . spraying equipment for crop protection.

Cessna 170

MAIL THIS COUPON NOW!

Cessna Aircraft Co.
Dept. OG-2, Wichita, Kansas

Please send free literature giving complete description of the Cessna 170.

Name_____

Address_____

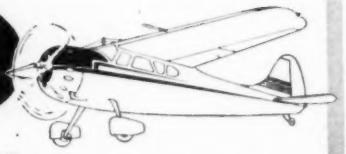
City_____ State_____

Firm Name_____

Phone No._____

On Display at Your Cessna Dealer's . . .

Cessna 190 SERIES



Big, beautiful, practical and amazingly economical. Airline-type engines and airline-comfort! Perfect for large businesses or small ones. 5 place. Cruises over 160 m.p.h. Hamilton Standard Constant Speed Propellers.

*During 1950, the Cessna 170 outsold all other four-place airplanes, regardless of price.

COLUMBIAN

BOLTED STEEL TANKS

Precision Engineered

Easy Assembly

Long-Life Service

Economical Storage

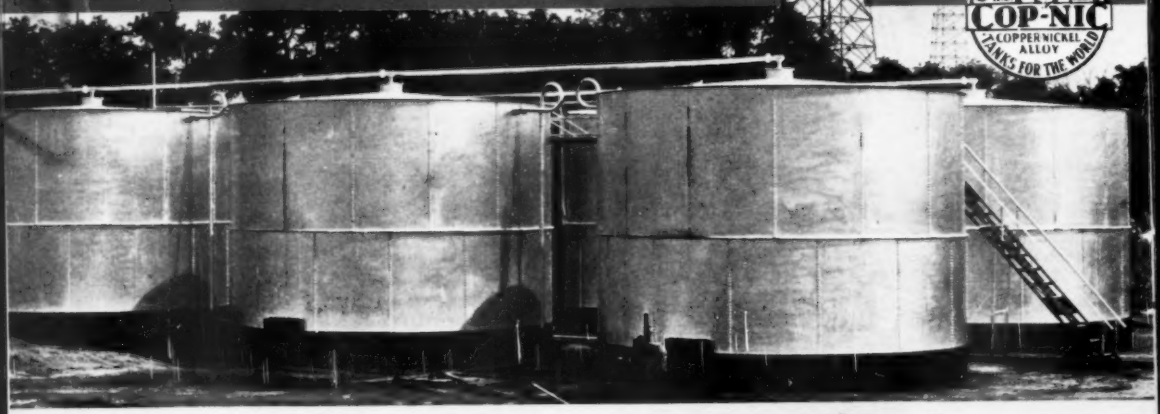
• From every standpoint of comparison Columbian Bolted Steel Tanks rank at the top when it comes to delivering the greatest value in service for every dollar invested in them.

Whether your requirements call for single small units for special storage or a battery of large capacity tanks, Columbian Tanks assure economy from the first day of erection.

Columbian Bolted Steel Tanks are available now for oil producers. Columbian COP-NIC Tanks, especially for sour crude, will be available when conditions permit.

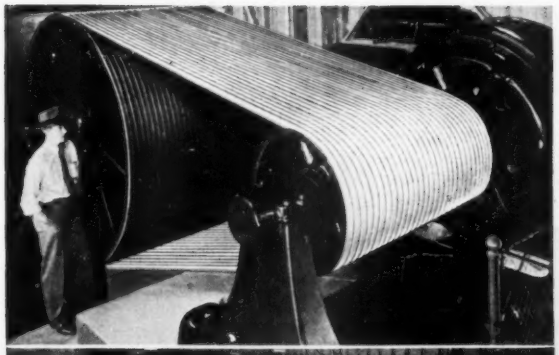
COLUMBIAN STEEL TANK CO. TANKS FOR THE WORLD

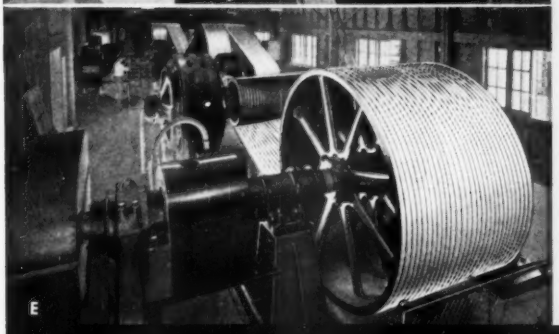
COLUMBIAN STEEL TANK CO. K.C. MO. COP-NIC A COPPER NICKEL ALLOY TANKS FOR THE WORLD



COLUMBIAN ALL-METAL BUILDINGS are practically unlimited in their low-cost utility value as warehouses, engine houses, garages, equipment houses, etc. Rigid, strong, fire-safe. They require minimum upkeep cost. Write for complete information.

COLUMBIAN STEEL TANK CO. P. O. Box 4228-H, Kansas City, Mo.





These 750-horsepower and 1000-horsepower Gates Vulco Rope Drives were originally installed in a West Coast butadiene plant in 1942 and ran nearly 5 years until the plant closed down. That plant is now running again—and the **original** Gates Vulco Ropes are once more producing the synthetic rubber so badly needed at this time.

This test shows how the Concave Side gives you a real saving in V-Belt costs

If you are interested in lower operating costs, make this simple test:—

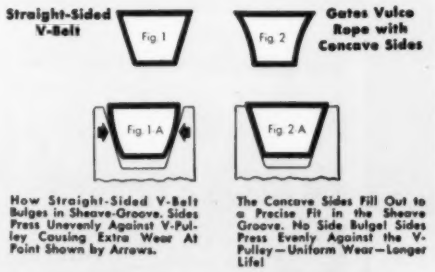
Take *any* V-belt and bend it as it bends in going around a pulley. As the belt bends, grip its sides with your fingers and thumb. You will *feel* the sides of the belt *bulge out!*

This bulging gives a straight-sided V-belt the shape shown in figure 1-A. (See diagrams at right.) Clearly, this shape does not fit the sheave groove. The sides of the bulging belt are forced to press unevenly against the V-pulley—and this concentrates the wear along the *middle* of the sides.

But when you bend a V-belt that is built with the *Concave Side*, you find that the sides become perfectly straight—as shown in Figure 2-A. This shape precisely fits the sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley *evenly* and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure you get the V-belt with the Concave Sides—The Gates Vulco Rope!

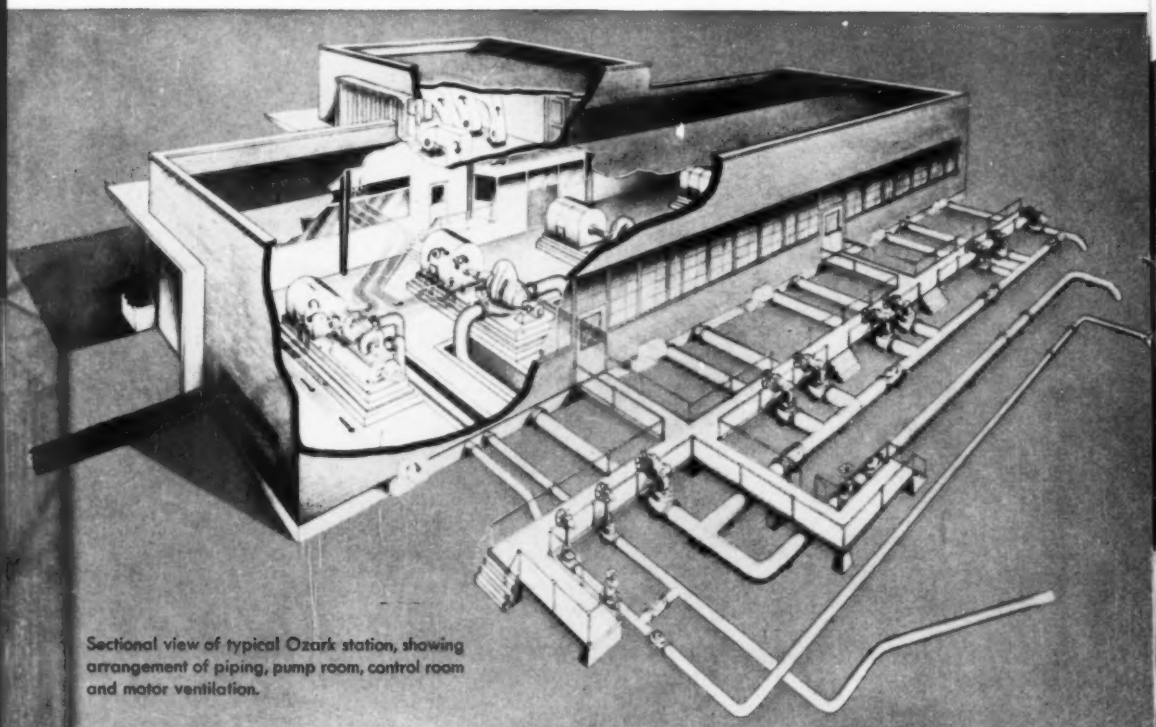
CS-514

Gates
Hose V-Belts
Molded Rubber Goods
for Industry

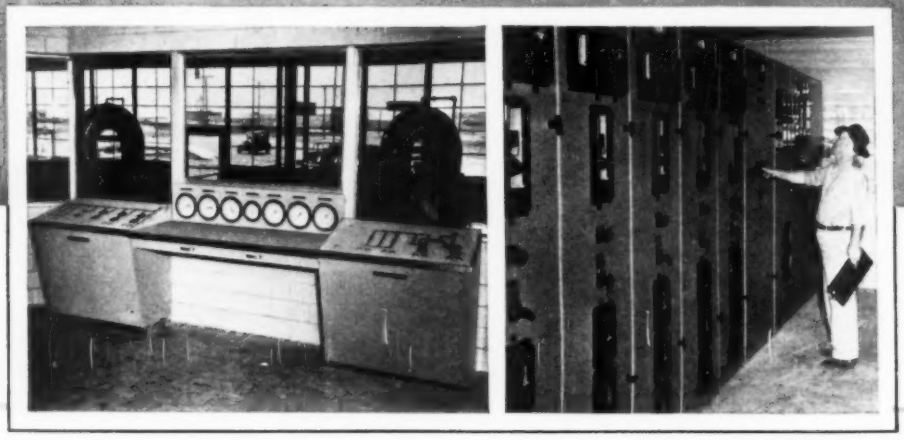
VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

YOU CAN BE **SURE**.. IF IT'S
Westinghouse



Sectional view of typical Ozark station, showing arrangement of piping, pump room, control room and motor ventilation.



The control desks for the pumping station are located in the operating room overlooking the pump room. Separate desks are provided for the 22-inch line and for the 10-inch lines.

Main pump motor control is Westinghouse 4,160-volt Metal-Clad Switchgear, with air circuit breakers of 100,000-kva interrupting capacity.

Complete Electrification

gives Ozark "Big Inch" automatic operation

"The mere pressing of three buttons by a single employee, performs twelve operations in six minutes, that would normally take two or three men an hour."

This statement before the Petroleum Electric Power Association describes experience on the new Ozark "Big Inch" oil pipeline. And it typifies the efficiency and economy of electrified pipelines, for with a revenue of $50 per minute depending upon quick start-up, the savings to be gained are obvious. But greater ease of control is only one way in which savings are gained. Complete electrification (by Westinghouse) of all of Ozark's pumping stations has also provided . . .

Greater flexibility—because over its 426 miles of 22-inch line, and modernized parallel 10-inch line, all stations can be operated "in step". This eliminates the necessity of storing successive pumpings in station balance tanks where the possibility of costly inter-batch contamination exists.

Greater reliability—because simplified electrical operation permits operating schedules to be easily maintained. The possibility of costly errors by station personnel, where many operations must be performed in sequence, is eliminated.

These important advantages plus greater safety, cleanliness and compactness of plant, explain today's trend to complete electrification. And these same advantages are available to you. Westinghouse can supply the equipment . . . the specialized engineering help . . . everything you'll need for complete electrification. So for dependable power apparatus . . . for undivided responsibility, come to Westinghouse . . . and be Sure! Just call your nearest Westinghouse office or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94853

Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY

TRACKSON *PIPE LAYERS*

This MDW8 -D8 team, with lift capacity to spare, cradles a 30" pipe on Associated Pipe Line Constructors' Transcontinental job near Baltimore.

LONG... ON PERFORMANCE SHORT ON COSTS!

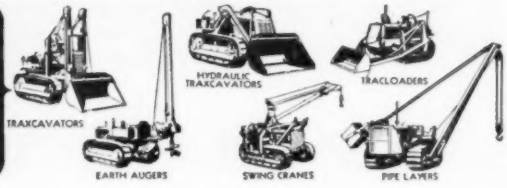
Double the Duty of Your Pipe Line Tractors . . . with a hydraulically-controlled TRACKSON ANGLEFILLER. In four sizes, the ANGLEFILLER adds countless duties to your PIPE LAYER-equipped tractors.

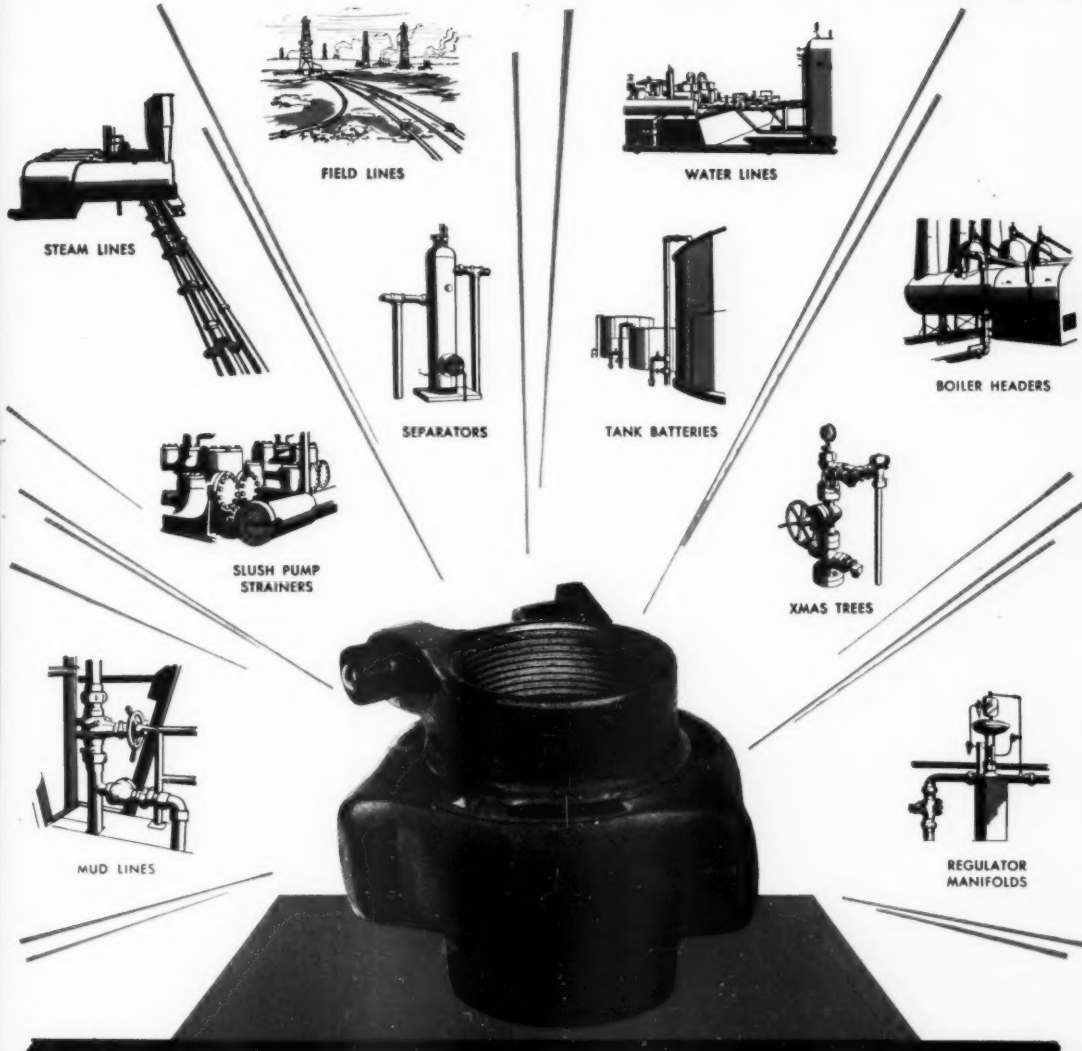
■ Always in the line-up when heavy lifts are on the schedule, TRACKSON MDW8 PIPE LAYERS are long on the features that put more feet of pipe in the ground each day.

Ruggedly built for long, hard duty, MDW8's are precisely engineered to match the power and ability of the "Caterpillar" Offset D8. Quickly extended and retracted counterweights, hydraulically controlled—offset, wide gauge design—together provide exceptional stability and safety to handle heavy loads with ease and keep work away from the trench to minimize cave-ins. TRACKSON's own transmission, backed by smooth-acting brakes and fast, positive controls handles the biggest-inch with precision care. Long-life, speed, and safety keep costs on the short side.

Your TRACKSON-"Caterpillar" Dealer can give you "the long and the short" of the MDW8—or any of the four other PIPE LAYER models. Stop in . . . talk over your pipe line plans . . . or write TRACKSON COMPANY, Dept. OG-51, Milwaukee 1, Wisconsin.

TRACKSON
TRACTOR EQUIPMENT





MAKE THE MOST OF A GOOD THING — UNIBOLT!

. . . the perfect coupling for drilling and production service

There is no limit to the uses for UNIBOLT Couplings in drilling and production service. Any line — steam lines, water lines, mud lines, oil and gas lines — can be coupled tighter, with a stronger joint, and dismantled and reassembled in fast time with UNIBOLT Couplings. Three types of seats: a metal ring gasket type for high pressure service, a renewable resilient type for saturated steam and low pressure oil, gas, or water lines, and a tongue and groove type which conforms to ASA-600 Series specifications for welding neck couplings. Hubs are provisioned for threaded, socket weld, or butt weld connections. The pressure range is up to 15,000 lbs. test.

So, you name the coupling job and UNIBOLT will furnish the coupling designed expressly for that job. Make the most of a good thing . . . UNIBOLT.

THORNHILL-CRAVER CO.

HOUSTON, UNIBOLT TEXAS

ATLAS ROLLER CHAIN

SERVING THE NATION

Coast to coast . . . border to border . . . Atlas Roller Chain and the incomparable Atlas service is available to you through hundreds of progressive, experienced power transmission distributors.

Each and everyone is ready, willing and able to show you how Atlas Roller Chain can help speed your production, cut down your maintenance and increase the utilization of your power.

Atlas Roller Chain is built to give longer service under the toughest operating conditions. The Atlas Nicarb Process of heat treating gives every roller, link, bushing and pin that *extra* life so necessary with today's production goals.

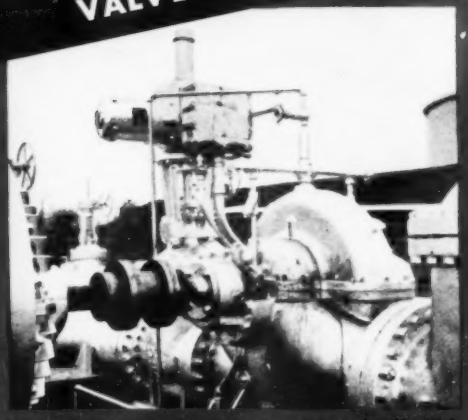
For roller chain that is built to last and service that is aimed to help . . . contact your nearest Atlas distributor. He has the data . . . the know-how . . . and the right size roller chain to speed your production.

ATLAS CHAIN & MANUFACTURING CO., PHILADELPHIA 24, PENNA.

109 LIMITORQUE VALVE CONTROLS

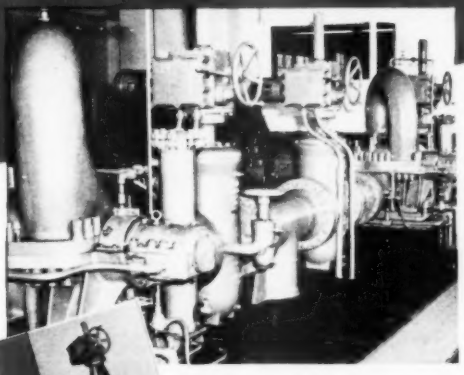
...the Exclusive Choice for all 7

MID-VALLEY PIPE LINE *Stations*



Above—Sextor pumps mounted at manifold rack with SM-3 LimiTorque at Hebron Station. Below—Mayersville Station. SM-3 LimiTorque controls on W-K-M gate valves.

Nordstrom plug valves on manifold rack, operated by type SM-1 LimiTorque Controls at Mayersville Station.



LimiTorques are available for all types of valves and may be supplied for actuation by any power source such as electricity, steam, gas, oil or air. Your valve manufacturer can supply them.

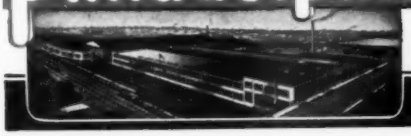
Send for LimiTorque catalog L-50. Please write on your business letterhead.

Mid-Valley is another of the nation's great pipe line systems to select LimiTorque Controls for valve operation. Located at all seven stations, these controls are on valves of various types, such as Darling, Powell, W-K-M gate valves and Nordstrom plug valves.

Only a few are indoors, all others are on valves remotely located about the stations. Like all LimiTorque Controls they have been designed and engineered to give years of safe, dependable and hard service even under severe weather conditions.

In each station, valves are electrically operated with push buttons on control desks. However, each control is provided with a handwheel for fast manual operation in case of power failure. *LimiTorque can always be declutched for handwheel operation regardless of weather or electrical conditions.* The units also have the torque limit switch feature, which protects valve operating parts from damage by foreign matter obstructions during operation.

Philadelphia Gear Works, INC.



ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH CHICAGO • HOUSTON

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

282 WELLS PUMPED BY *Electric Power*

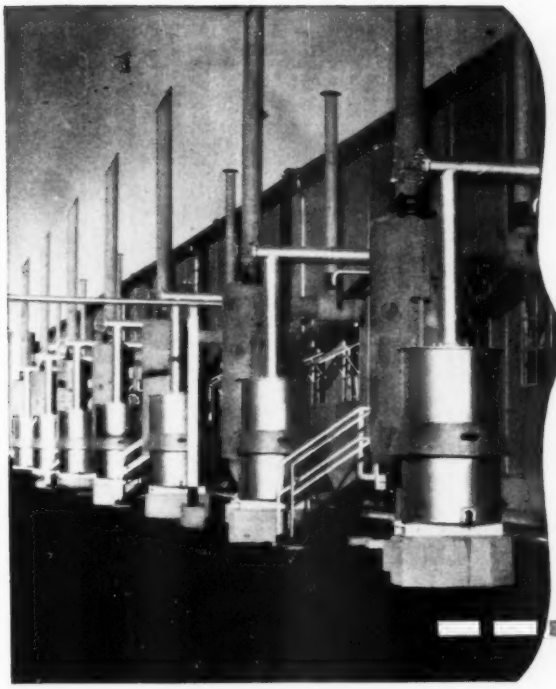
Recognize this scene? The view is a portion of the 282 producing wells in the Goose Creek Field near Goose Creek, Texas, which are pumped by Electric Power. With less manpower and with definitely less maintenance cost a few wells or hundreds of wells can be pumped AT LOWER COST. If saving power dollars during these inflationary days appeals to you, don't decide until you have fully investigated the advantage of LOW COST Purchased Electric Power!

Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS



Every Cycoil is a SAVINGS BANK

Freedom from Dust-Damage Cuts Repairs and Costly "Down Time"

Each of the Cycoil Oil Bath Air Cleaners serving these eight 1200 hp engines actually "doubles" as a savings bank. The dust it collects represents hard cash that *won't* be spent on engine repairs and resulting shutdowns due to dust-damage.

Here's why you are assured of tangible, continuous savings over the years with Cycoil. This air cleaner is designed to operate at 100% efficiency in the removal of damaging dust. Over 90% of the total fine-dust content of the air is trapped by Cycoil oil-bath action even before reaching the filter pads. Positive oil circulation for continuous self-cleaning action, plus the added filtration to be had in the filter pads, results in approximately 100% clean air.

Write for Bulletin No. 130. It gives you the detailed story of Cycoil's proven design and high efficiency.

Today's Best Buy is Better Air!

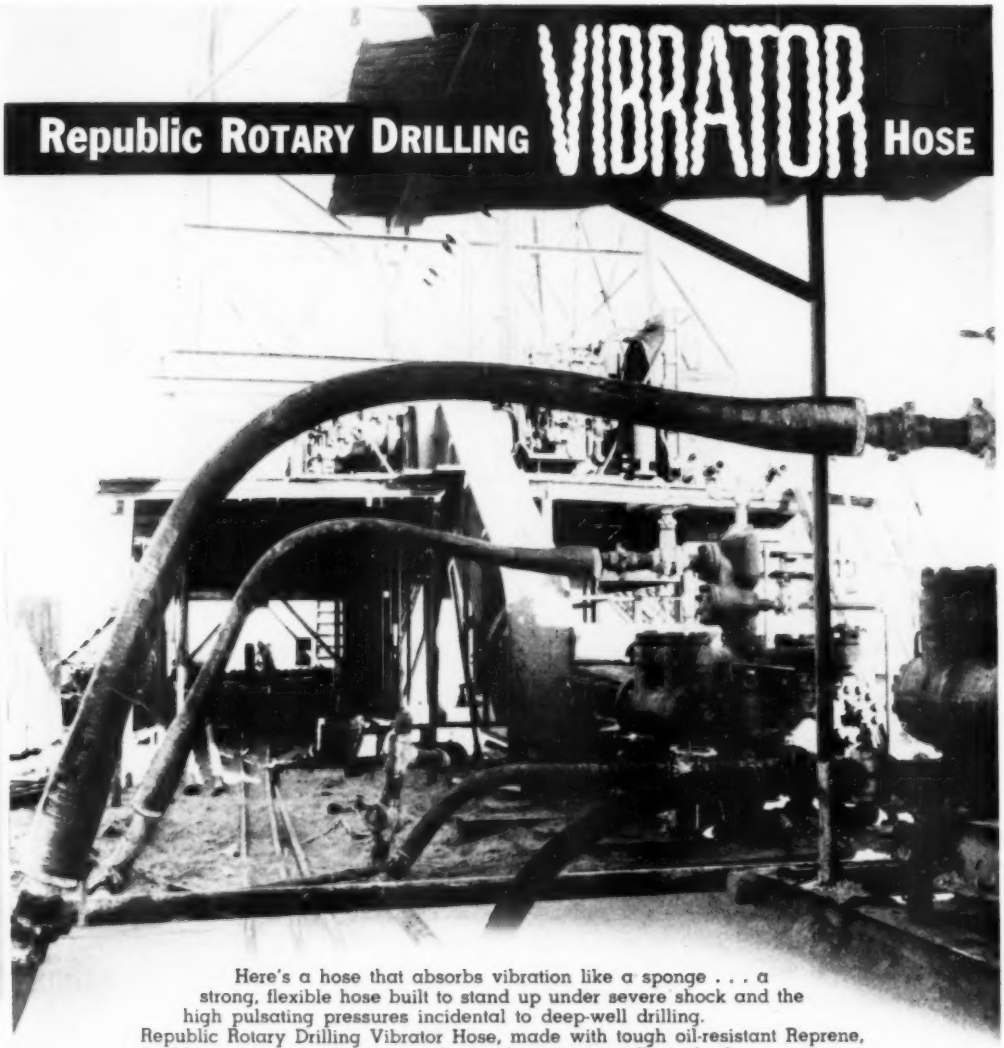
AAF

American Air Filter

COMPANY, INC

444 Central Avenue, Louisville 8, Kentucky • Darling Bros., Ltd., Montreal, P. Q

Republic ROTARY DRILLING VIBRATOR HOSE



Here's a hose that absorbs vibration like a sponge . . . a strong, flexible hose built to stand up under severe shock and the high pulsating pressures incidental to deep-well drilling.

Republic Rotary Drilling Vibrator Hose, made with tough oil-resistant Reprene, is highly resistant to abrasion and the deteriorating effect of oil.

Flexible steel muscles give Republic hose maximum resistance to pressure and protection against distortion. The patented Boltless Coupling, streamlined to the bore and shape of the hose, assures a leak-proof union and a snag-free hose.

Republic Rotary Drilling Vibrator Hose is supplied in standard 10, 12, 15, 20 and 25-ft. lengths complete with coupling. Every length is designed to withstand a test pressure up to 5,000 psi upon delivery. Contact your Republic Distributor or write direct for further information.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

MID-CONTINENT DISTRIBUTORS

The Bovaird Supply Co. Tulsa, Okla.

Jones & Laughlin Supply Co. Tulsa, Okla.

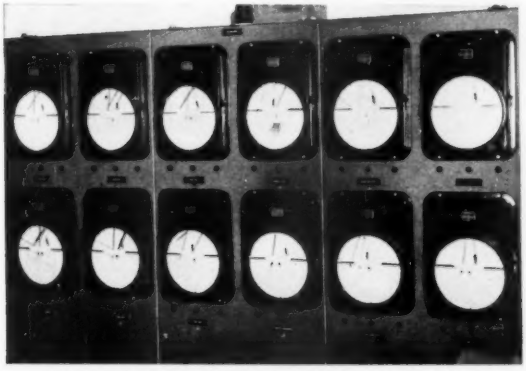
WEST COAST DISTRIBUTORS

W. C. Hendrie & Co., Inc. 405 Towne Ave., Los Angeles, Calif.

Pacific Coast Rubber Co. 51 Main St., San Francisco, Calif.

GAS DISPATCHING MADE EASIER

by Bristol Metameter* telemeters and remote control



THESE BRISTOL METAMETER RECEIVERS are in the dispatcher's office of Colorado Interstate Gas Company.

AREA COVERED BY BRISTOL METAMETER TELEMETERS. This installation has been in operation for four years.

No matter how far-flung and complex a pipe line system may be, critical pressures and flows all along the line can be observed and controlled from a central point by Bristol Metameters.

The use of Metameters by the Colorado Interstate Gas Company is typical. Bristol Metameter receivers in its Colorado Springs dispatching office record suction and discharge pressures at nine of the compressor stations along its 555 mile gas pipe line and the flow and static pressure at five of its metering stations.

These Metameter telemeters give the dispatcher a clear picture of pressure and flow conditions along the entire pipe line.

Many other pipe line and gas companies from coast to coast use Bristol Metameter to obtain up-to-the-minute knowledge of what is going on throughout their systems and maintain finger-tip control over any combination of conditions that may arise. Several installations have been in operation over 15 years.

Use by pipe line companies includes (in addition to those mentioned above) remote setting of regulators and flow controllers; remote readings of pressure at transfer point and flow of gas into distribution system; sounding alarms when low and high limits of pressure and flow are exceeded; totalizing flow through several lines. Readings are transmitted over any two-wire circuit or its equivalent (private wires, telephone circuits, carrier channels and radio, including microwave). Receivers may be recording (narrow or wide strip or round chart) or indicating.

For further information on the use of Metameters by pipe line and gas companies, from coast to coast, request Bulletin M1700, THE BRISTOL COMPANY, 120 Bristol Road, Waterbury 20, Conn. *Reg. U. S. Pat. Off.

THE DEPENDABLE GUIDEPOST OF INDUSTRY

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

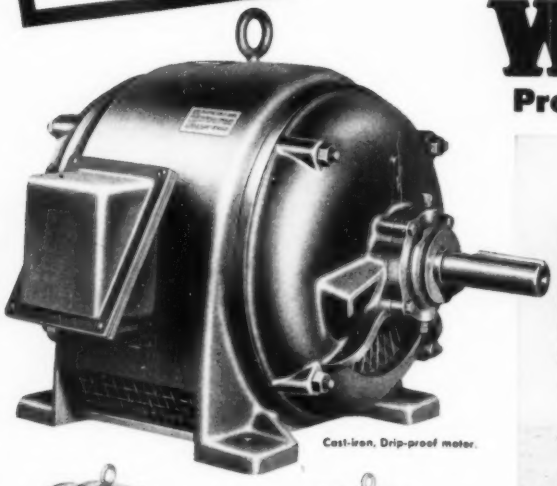
for dependable operation of

OIL WELL PUMPING UNITS

CHOOSE

Wagner

Protected Type Motors



Cast-iron, Drip-proof motor.

Cast-iron, Splash-proof motor.

Totally-enclosed fan-cooled motor.

Oil well pumping rigs need motors with plenty of stamina. They must operate without attention, day in and day out, in driving rain—or sand and dust storms—under a blazing sun—and in freezing weather. Sturdy, dependable Wagner Motors have shown such stamina in thousands of tough jobs . . . That's why you'll find so many Wagner Motors on the job in the oil fields.

Wagner polyphase motors for oil well pumping are built in two electrical types: High torque, normal slip; and High torque, high slip. The line includes drip-proof motors that are economical to use and splash-proof motors, protected against heavy driving rains. For applications requiring single-phase motors, Wagner can furnish capacitor-type motors with the same enclosures. The line also includes totally-enclosed motors for use in pumping stations and refineries.

Bulletin Sheet MU-115 and Bulletin MU-132 give full information on these motors for the petroleum industry. Thirty-one branch offices are ready to assist you in any motor application problem.

WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

® Wagner Electric Corporation
1891 WE 1951

MU-50

When The New Oil Era Dawned At Spindletop...

LUNKENHEIMER VALVES

Were Already Established
As Oil Industry Favorites

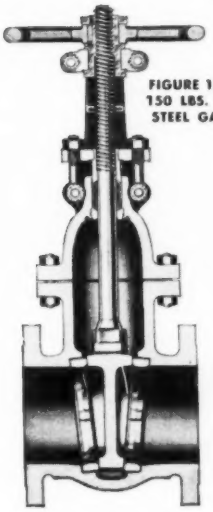


FIGURE 1751
150 LBS. S.P.
STEEL GATE

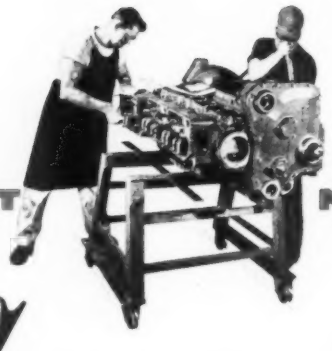
Spindletop gushed . . . and the rush was on. It was the beginning of a new industry for the Southwest . . . and a new era for oil. The pioneer OIL AND GAS JOURNAL was a lusty infant, heralding the fabulous Texas oil-strike. And Lunkenheimer valves were in *new* demand— to control the new networks of oil transportation and storage that soon reached across America. Since the earliest days of the oil industry, Lunkenheimer valves have been established favorites . . . and today, they are still unmatched for round-the-clock petroleum service. Today's widely-used Lunkenheimer Fig. 1751 is a Steel Gate Valve, rated at 150 lbs., and especially engineered for oil service. It's available with trim for lubricating fluids in sizes from 2 to 24 inches. Modern end-seated rings can't warp as they're tightened . . . seal against the body wall to prevent internal corrosion. The wedge rises clear for streamlined flow that reduces turbulence and keeps pressures high. You can repack the Fig. 1751 while it's fully open and under pressure. And you'll like the extra wear you get from its sturdy stem-threads and carbon steel pressure-parts. *"Lunkenheimer Oil Industry Valves," a catalog-brochure in color, describes more than 50 popular "service engineered" valves for the petroleum processing field. Your copy is available from* The Lunkenheimer Co., Box 360F, Cincinnati 14, Ohio.

STEEL • IRON • BRONZE

L-351-13A

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES



BUILT NOT ONCE BUT TWICE

Cummins®

CUSTOM BUILT

Diesels

Rugged, lightweight, high-speed Cummins Diesels perform better because they're custom-built to *fit each job.* And each engine is actually built twice. Assembled, run-in tested, disassembled, inspected . . . then reassembled and tested *again.* Precision building, Cummins exclusive fuel system . . . efficient service and parts organization, enable users to get peak performance, less "down-time" and *more* rugged, dependable power from Cummins Diesels. *See your Cummins dealer.*

Lightweight High-speed Diesel Engines (50-550 hp) for: on-highway trucks • off-highway trucks • buses • tractors • earthmovers • shovels & cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft

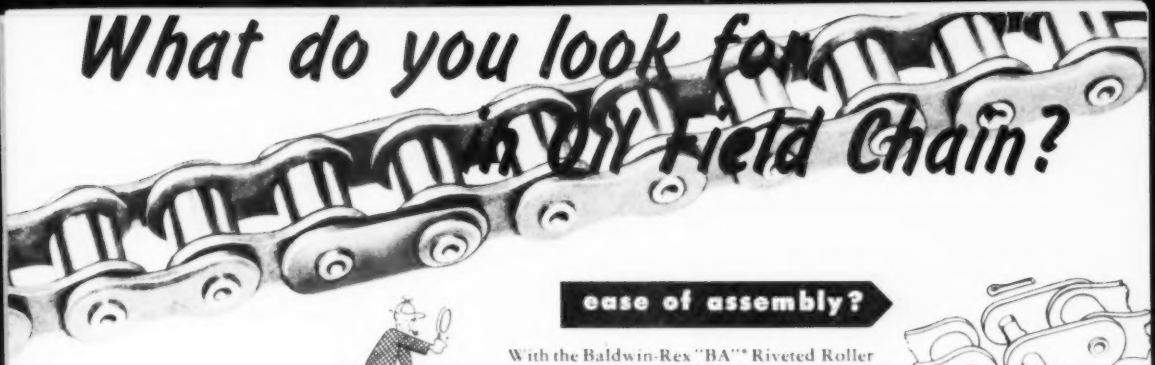
CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

Diesel power by **CUMMINS**

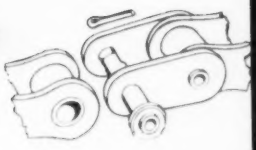
CUMMINS Industrial DIESEL

What do you look for in Oil Field Chain?



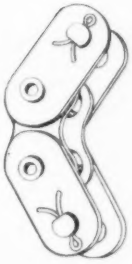
ease of assembly?

With the Baldwin-Rex "BA"* Riveted Roller Chain, assembling or disassembling roller chain in the field or in the supply store is the easiest you've ever known. Just locate the special connector link, remove the cotter and drive out the pin. That's all there is to it. No danger of damaging parts or fits as with ordinary riveted chain.



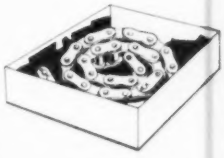
ease of adjustment and repair?

Keep a supply of "BA" 3 Pitch repair units on hand. They're your insurance against loss of drilling time. If a chain becomes damaged while in service, it can quickly be fixed right on the job by inserting one or more repair units. What's more, "BA" repair units are interchangeable with any standard roller chain.



fast, convenient service?

The "BA" Assembly is shipped in boxes containing two standard 5-foot lengths of chain. Each strand contains two single pin connectors at approximately the 2' and 5' mark. Thus, it's easy for you or your supply store to *build up* exact length of chain you need without "cutting" chain. Standard "BA" short units of various lengths are available for this purpose. Offset links can also be added and then removed to compensate for chain elongation.



high strength and ability to "take-it"?

All Baldwin-Rex Roller Chain is made of the finest material, manufactured to the highest quality standards. With "BA" you get all the advantages of riveted chain—long life . . . high strength . . . a more positive lock between pin and plates—plus the amazing ease and convenience of handling described above. What's more, in single strand, the cost of "BA" is actually lower than the cost of cottered chain!

* "BA" means Baldwin Assembly

So next time you order chain, be sure to "look for" the distinctive "BA" link. It's the sign of quality, convenience, service and economy.

For all the details on all Rex and Baldwin-Rex Oil Field Chains, write for bulletin 51-B. Chain Belt Company 1619 West Bruce Street, Milwaukee 4, Wisconsin

BALDWIN·REX®
ROLLER CHAINS

BALDWIN-DUCKWORTH DIVISION OF CHAIN BELT COMPANY

"MADE TO ORDER"
for Oil Field Drilling

REX® A.P.I. CHAINS

These famous rotary drilling chains are especially built for oil field needs. Five Rex features make them perennial favorites around the drilling rigs.

★ **BALANCED DESIGN**—strength of chain parts is properly balanced for longer life . . . lighter weight.

★ **MAXIMUM WEAR RESISTANCE**—high carbon alloy steel, heat treating, case hardening, all combine to produce a chain that lasts longer.

★ **FORCE FIT ASSEMBLY**—parts machine assembled into famous Rex Unit Link. Each link exactly alike—they retain uniformity under toughest conditions.

★ **EFFECTIVE LUBRICATION**—oil holes in bushings assure placing of oil where it's really needed.

★ **EASY TO TAKE APART**—Rex 3-diameter pin makes assembly and disassembly easy. No need for heavy driving or use of drift pins.

NO OTHER PUMP COMBINES ALL THESE!

The Rex Self-priming Oil Field Utility Pump combines 5 great features that add up to *outstanding performance—outstanding value.*

★ Extremely Simple Design.

★ All Wearing and Moving Parts accessible with removal of one cover plate.

★ Lightweight...easily portable, yet really sturdy.

★ Simplest, most positive leakproof seal ever designed.

★ Patented Rex Adjustable Air Peeler assures "new pump" efficiency for its entire life.

See it at your nearest supply store. Rex Oil Field Sales Offices are located in these cities: NEW YORK • TULSA • DALLAS • HOUSTON MIDLAND • LOS ANGELES

CHAIN BELT COMPANY

BALDWIN-DUCKWORTH DIVISION
SPRINGFIELD 2, MASS.

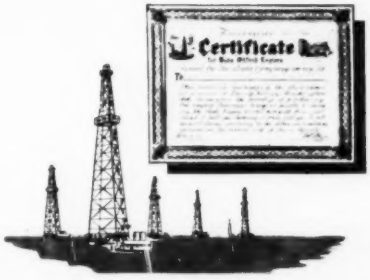
REX CHAIN & TRANSMISSION DIVISION
MILWAUKEE 4, WIS.

REX CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 4, WIS.

PAY FOR 1 BUDA "2505" ENGINE

and get 2*

*When you buy one Buda 2505 Series engine . . . plus the "Fuecomizer Package". . . you get 2 engines . . . full gas or full Diesel—permitting you to use the most economical fuel wherever you're drilling. Buda's "Fuecomizer Package" is the answer to the drilling contractors' power requirements to operate in all locations using the most readily available, economical fuel. Ask your nearby Buda Oilfield Distributor for full details on the 2 for 1—2505 engine deal, today. Data furnished without obligation. The Buda Company, Harvey, Illinois.



BO-17

Wherever There's Oil... There's Buda...Engines ...Parts and Service

BUDA

BUDA Oilfield Distributors are located in: Dallas • Tulsa • Los Angeles • Houston • Oklahoma City • Seminole • Wichita Falls • Shreveport • Bakersfield • Tinsley • Pampa • Great Bend
Long Beach • Kilgore • Mt. Carmel, Ill. • Alice • Odessa • Casper • Lafayette • Artesia • Denver • Ulysses • Brookhaven • New York City (Export) and in Canada at Calgary and Edmonton

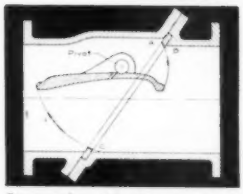
Stop Expensive Slamming With the Cushioned Closing of CHAPMAN TILTING DISC Check Valves

Those words — *cushioned closing* — best describe the action of this unique check valve. The tilting disc works with the stream—opens easily, closes quickly, *yet quietly.* There's no slamming — no resultant destructive stresses on the pipeline.

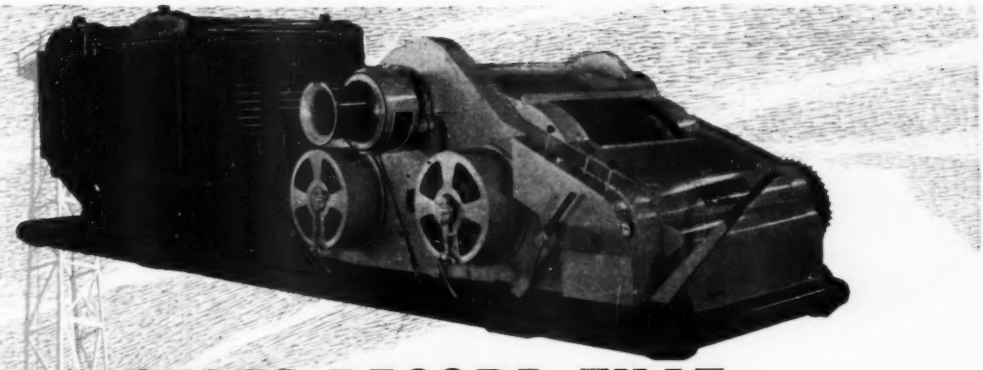
As a result of this smooth, *cushioned action*, maintenance costs are at a minimum and savings of from 65% to 80% in head losses can be obtained over conventional-type check valves.

Send today for the bulletin describing this unusual valve.

THE CHAPMAN VALVE MFG. CO.
INDIAN ORCHARD, MASSACHUSETTS



Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.



A SALES RECORD THAT PROVES ACCEPTANCE

Since the U-34 was introduced in April, 1948, over seventy of these models have been put into operation. Approximately 30% of the units sold were reorders by satisfied users. Where can you find an acceptance record as good as this for a brand new drawworks?

SPECIAL FEATURES OF THE U-34 AND U-34D

VERSATILITY — Single or double-drum models. One or two engines. One package unit or split-rig unit make for many combinations to suit your individual needs.

SPEED — Fast operating combination because each engine is equipped with a torque converter which allows each engine to reach high speeds QUICKLY where maximum Horse Power is attained.

SAFETY and SIMPLICITY — All controls designed for the convenience of the operator. Self-energizing, fully equalizing, one point adjustable brakes. Self-cooling Air-O-Matic clutch requires no adjustment. One-lever control for all drum speeds. Unique design of control and drum clutches practically eliminates clutch failure.*

PORTABILITY — Designed so drawworks and power unit may be transported in one load, thus reducing moving costs and time.

*One set of clutches shows slight wear after 90,000' of drilling. To March, 1951 only one clutch failure —caused by low air pressure.

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA, U.S.A.

DESIGNED FOR THE JOB....

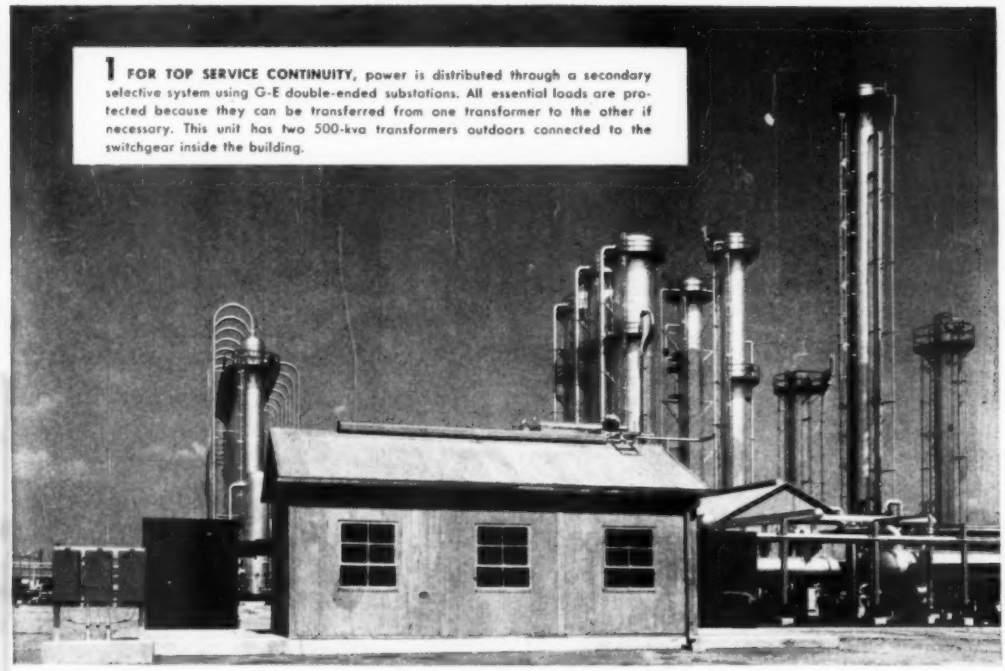
UR-514

UNIT RIG DRAWWORKS ARE SOLD EXCLUSIVELY THROUGH THESE AUTHORIZED DISTRIBUTORS

BOVAIRD SUPPLY COMPANY
HOUSTON OIL FIELD MATERIAL COMPANY
HOWARD SUPPLY COMPANY
IVERSON SUPPLY COMPANY
JONES & LAUGHLIN SUPPLY COMPANY
LUCEY PRODUCTS CORPORATION
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
OIL WELL SUPPLY COMPANY

EXPORT SALES — MID-CONTINENT SUPPLY COMPANY, 42 Broadway, New York City. Cable — MIDUNITRIG

A PHOTO-REPORT ON MODERN


1 FOR TOP SERVICE CONTINUITY, power is distributed through a secondary selective system using G-E double-ended substations. All essential loads are protected because they can be transferred from one transformer to the other if necessary. This unit has two 500-kva transformers outdoors connected to the switchgear inside the building.

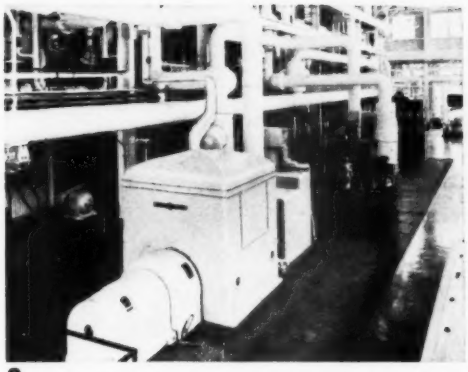
Gas cycling plant protects its ½-billion-CFD capacity!

Uses General Electric equipment—including double-ended unit substations in secondary selective arrangement—to maintain high service continuity

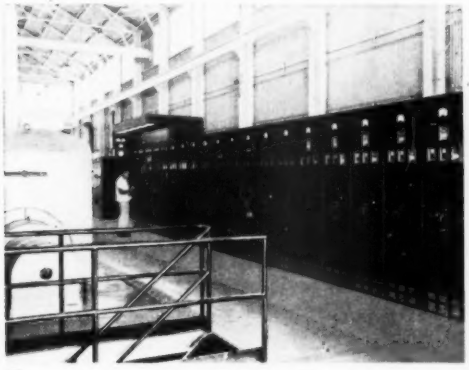
Stripping condensible by-products from "wet" gas, compressing it as "dry" natural gas, and injecting it back into the production formation, calls for power-system reliability—especially when it's done at a rate of 500 million cubic feet per day! To help safeguard production continuity in key areas at this large Gulf Coast cycling plant near Katy, Texas, reliable General Electric equipment is used. It will pay you to look to General Electric for all *your* refinery's electric equipment, plus skilled engineers to help apply it most economically. Ask your local G-E representative for the full story —soon. *Apparatus Dept., General Electric Company, Schenectady 5, N.Y.*

GENERAL ELECTRIC

661-26



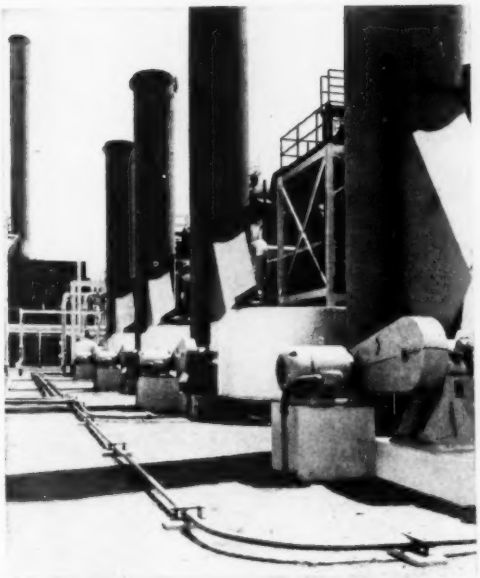
2 **DEPENDABLE POWER GENERATION** is provided by these two G-E turbine-generator sets, each rated 2500 kw, 4160 volts, with top-mounted generator coolers. The 6-stage turbines are rated 600 psig, 700 degrees F, 265 psig back pressure. G-E turbine-generators, designed for reliable operation, give maximum output per dollar of fuel cost.



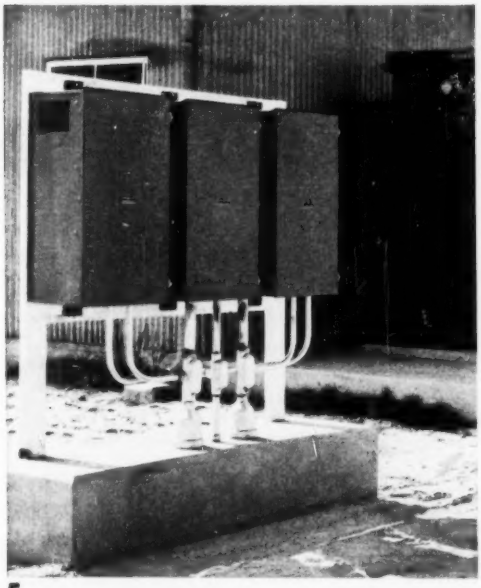
3 **COMPLETE CONTROL** of plant-generated power is supplied by this G-E 4160-volt metal-clad switchgear. Deadfront metal enclosures protect operating personnel. Circuit breakers—of adequate interrupting capacity for the plant's needs—are easily removable to simplify maintenance. Units are shipped assembled, ready for easy installation.

*Reg. Trade-mark of General Electric Co.

Co-ordinated ELECTRIC EQUIPMENT for Gas Cycling and Repressuring



4 **3-WAY EXTRA PROTECTION** against physical damage, electrical breakdown, and operating wear and tear is built into these four G-E Tri-Clad* totally enclosed fan-cooled motors driving outdoor boiler fans in the Katy plant. Rated 75 hp, 440 volts, 1200 rpm, they have corrosion-resistant cast-iron enclosures to withstand acids, alkalis and solvents.



5 **TO PREVENT CORROSION** of piping, G-E rectifiers are used for cathodic protection. Giving longer life, lower maintenance costs, and reduced shutdown time, G-E selenium rectifiers incorporate corrosion-resistant, oil-immersed stacks which are hermetically sealed against contamination by moisture or fumes in the air.

Emblem Of Leadership

There's no substitute for experience—or for quality. Drillers with a life-time of experience select as their *first choice* Thermoid Powerflex Rotary Hose for safety, dependability, and economy.

Powerflex Rotary Hose is tested to 5000 psi before shipment—a test far more severe than the most grueling field operations . . . Tube is synthetic rubber, oil and abrasion resistant —reinforced with steel cables and prestretched fabric . . . Cover resists aging, abrasion, cracking . . . Couplings are built-in and anchored securely for life of hose.

Thermoid Powerflex Rotary Hose is an achievement in *advanced* hose engineering . . . it is a typical example of the high quality which has made all Thermoid Oil Field Products leaders in the oil fields.

Midcontinent office and warehouse: Houston, Texas

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Thermoid

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Every Second the Clock Ticks Over $5 in Productive Time is Lost from Industrial Eye Accidents!

You Can Prevent 98% of these Accidents with Safety Goggles averaging $2.30 in cost

The annual cost of industrial eye accidents in *lost productive* time alone is estimated at $160,000,000—or about $5 every second the clock ticks. In lost man power this represents the equivalent of 55,000 skilled workers who could be added to the productive work force each year if Eye Protection Programs were installed universally.

With skilled workers becoming increasingly short, it will pay you to look into the labor conservation and money-saving opportunities that an AO Eye Protection Program can provide. Your AO Safety Representative can show you case history after case history in your own or allied industries where such a program has paid off in *greater output* and *lowered costs*. Ask him to call.

FACTS TO REMEMBER: Industrial eye injuries cost over $5 per employed worker per year — with compensation averaging $328 per injured man even in the low-cost year of 1938.

American Optical Company
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

The principle of the unique Thrust Controlled Seating feature of C-H TNY operators

During seating movement, Fulcrum is at A and drive is down, toward the valve seat. At moment of tight seating, Fulcrum transfers to B and further drive is upward, absorbed harmlessly by the springs to trip the Thrust switch and disconnect the motor.

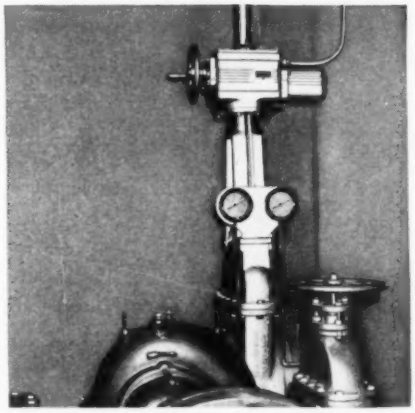
Automatic Valve Operation?

Thrust Control makes it Safe and Accurate, too!

IN THE petroleum industry, automatic, instant and swift motorized valve operation is an economic "must." Distance, difficulty, frequency of operation and danger are factors that urge such a step.

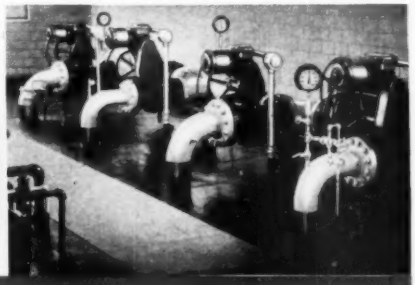
But the problem is also one of *accurate* and *safe* seating . . . as assured by the Thrust Control principle employed exclusively in Cutler-Hammer Valve Operators. The motor *positively* drives the valve disc home. During the driving period, the fulcrum is established at the yoke nut by heavy steel springs which exactly balance *tight seat pressure*. Therefore, at the very instant of desired tight seating, the driving fulcrum transfers to the seat of the valve, hence any further drive is into the yoke nut, against the heavy springs which harmlessly absorb motor drift. The movement of the yoke nut against the springs trips the *THRUST* switch to disconnect the motor. The amazing part is that the same degree of tight seating is maintained no matter how much valve parts may expand or contract. No other valve operator has or can have this direct *THRUST* controlled feature. No other valve operator can be as safe and sure and accurate. CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
VALVE CONTROL
C-H



Exclusive Cutler-Hammer Thrust Control Valve Operators from few pounds thrust up to 80 TONS can be applied to any gate valves in the petroleum industry.

For valves which do not seat, such as the plug type valves, C-H B2 automatic declutching valve operators act swiftly and stop instantly.



OTHER CUTLER-HAMMER PRODUCTS FOR THE OIL AND GAS INDUSTRY

Long-lasting control that "schedules" oil well pumping

This Cutler-Hammer Motor Control Device built to the rigid requirements of tough oil country service automatically starts pump going and shuts it down in synchronization with oil well capacity or in conformity to operating schedule. You can set up any sequence of day and night operation, set it to skip certain days. Bulletin 9589D-21 tells all about this amazing pumping control. Send for free copy.

Know what you are buying, selling, giving away

These "gas counting" instruments tell you accurately

Cutler-Hammer Calorimeters . . . standard wherever gas is bought or sold—actually count the B. t. u.'s per cubic foot of the gas you are sending or receiving. Accurate within 1%. They also write a continuous 24-hour a day permanent record so you know at all times exactly what is going through your piping system . . . for accurate accounting and billing, and for accurate control of gas heating value. Free booklet "Where Experience Counts" tells all about C-H B. t. u. Control.

In Elliott YR turbines you get both

...the benefits of standardization plus those of specialized design!

HOW? Because of a number of permissible modifications that enable the standard YR unit to meet practically any specialized application. Here are some of the adaptations:

Many elective governors, supplemented by the independent overspeed governor... A variety of speed changers... Gland sealing for operation with gas... Gland seal piping for condensing operation... Elective location of exhaust... Five frame sizes, eight turbine types... Capacities from 1 to 2000 hp, speeds from 800 to 6000 rpm... Back pressures to 250 psig... Supplied with built-in gear unit if desired. All this in totally enclosed, spark-proof construction. For full details write for Bulletin H-16.

HALF CENTURY OF 1901 EC 1951 POWER PROGRESS

H-722

ELLIOTT COMPANY

STEAM TURBINE DEPT.
JEANNETTE, PA.

Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

Promise of a bright future —a CLARK Drive Unit

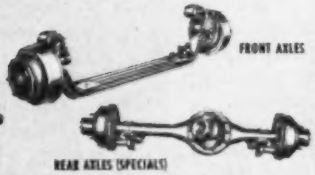
The tractor propelled by this CLARK drive unit is establishing a remarkable performance record—which is exactly what its designers intended it should do, and knew that it would do.

It's a special design perfected by tractor engineers and Clark engineers working together—a good combination, and a trustworthy promise of a bright, dependably useful future.

This same excellent principle applies to all heavy-duty machinery—agricultural and industrial: It's good business to work with Clark.

OTHER PRODUCTS OF CLARK—

AXLE HOUSINGS

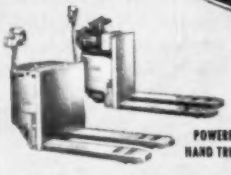


FRONT AXLES

REAR AXLES (SPECIALS)

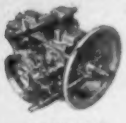
FORK-LIFT TRUCKS AND TOWING TRACTORS

ELECTRIC STEEL CASTINGS



POWERED HAND TRUCKS

GEARS AND FORGINGS



TRANSMISSIONS

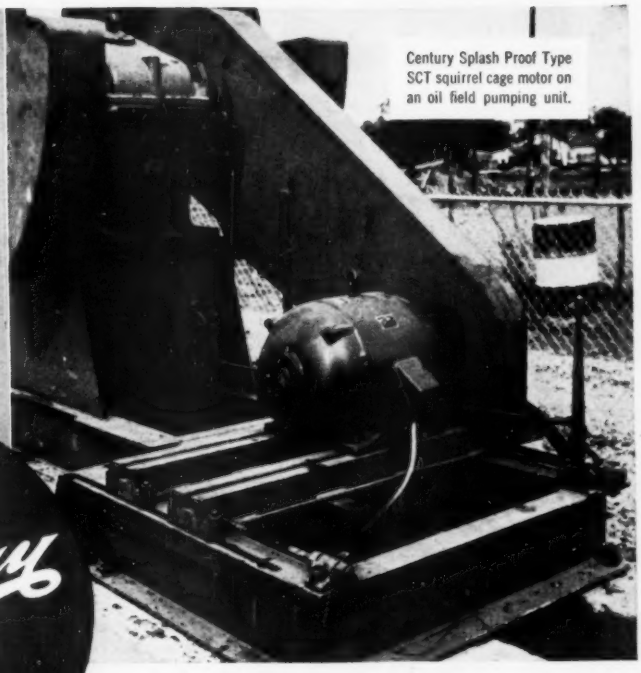
STREET RAILWAY CAR TRUCKS

CLARK EQUIPMENT COMPANY

BUCHANAN, MICHIGAN

OTHER PLANTS—BATTLE CREEK, JACKSON, MICHIGAN

For Steady, Economical Pumping



Century Splash Proof Type SCT squirrel cage motor on an oil field pumping unit.

SPECIFY Century TYPE SCT Protected **MOTORS**

Century Type SCT "high slip" pumping unit motors save wear and tear on equipment. This high slip characteristic permits the motor to slow down as the load comes on. This cushions the impact of the peak load and minimizes the sudden shock to both motor and equipment.

Century Splash Proof Motors assure continuous production in any kind of weather.

Thousands of Century splash proof motors have been operating, out in the open, in rain, snow, sleet and ice, since their development 16 years ago.

They are widely used for the operation of oil well and irrigation pumps, cooling towers, river lock and dam installation and where the equipment is regularly washed down, etc.

Century builds a wide range of motors for oil producing, refining and distributing. Specify Century for all your electric power requirements.

See your nearest supply store for complete information.

CENTURY ELECTRIC CO.
1806 Pine St., St. Louis 3, Mo.
Offices and Stock Points in Principal Cities

Century Electric Company is Celebrating Its 50th Year in the Electrical Industry.

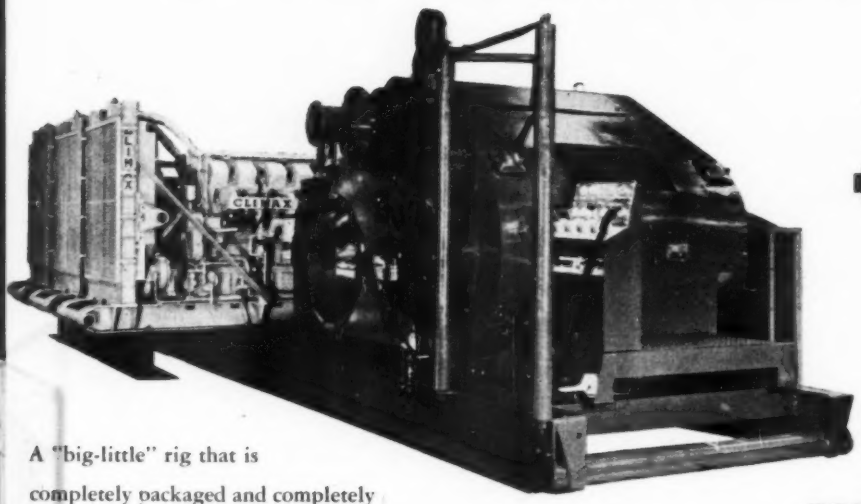
Century C MOTORS

701

Century GENERATORS—

Where public service current is not available, Century Generators will provide adequate, continuous electric power. Depending on the load per motor and the size of generator, from 10 to 30 wells can be operated from one generator. They provide a dependable source of oil field power.

EMSCO *Announces...*



A "big-little" rig that is completely packaged and completely portable has been added to Emsco's famous line of "G" rigs. It's the new GB-800. It retains all of the field-proven features of the "G" rigs. In addition, it gives you these advantages:

- ***Greater operating economy.***
- Reduction in hole-to-hole down-time.
- Drawworks, engines and compounding transmission mounted on a common skid, or as a single-step, two-package unit.
- Simple, easy and fast means of removing and installing engines.
- Clean design that permits cradling of entire unit in the substructure.
- In line and individually-driven mud pump drives located at back of engine compound.
- Totally enclosed, positive pressure lubrication system.
- Drawworks friction clutches located on outboard ends of shafts.
- Console-mounted valve controls at driller's position.
- Large diameter drum.
- Two or three-engine compounding transmission.
- Optional built-in sand reel.
- Optional Emsco auxiliary brake package, dynomatic or hydromatic.

UNMATCHED PORTABILITY

Never has a rig of this horsepower been so completely portable . . . so quick and easy to rig up and tear down!

In the flat set, one-package rig, with drawworks, engines and compounding transmission mounted on a common skid, it is *never* necessary to break chains, oil lines or air lines. In the stair-stepped, two-package rig, only the in-put drive has to be disconnected in moving the rig.

The GB-800 is designed throughout to give you the most in portability and operating efficiency. For specifications and operating details call CONTINENTAL, or write for new Emsco "G" series rig bulletin.

EMSCO

EMSCO DERRICK & EQUIPMENT COMPANY

Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

CONTINENTAL

"SERVING THE OIL AND GAS INDUSTRIES"

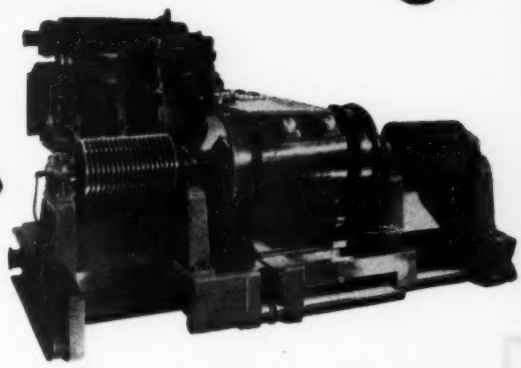
THE CONTINENTAL SUPPLY COMPANY,
General Offices: Dallas, Texas
THE CONTINENTAL SUPPLY COMPANY, LIMITED,
Calgary, Alberta

Export Division: THE CONTINENTAL SUPPLY CO., INC.
30 Rockefeller Plaza, New York 20, N. Y.
Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, England, Peru, Trinidad, Uruguay, Venezuela

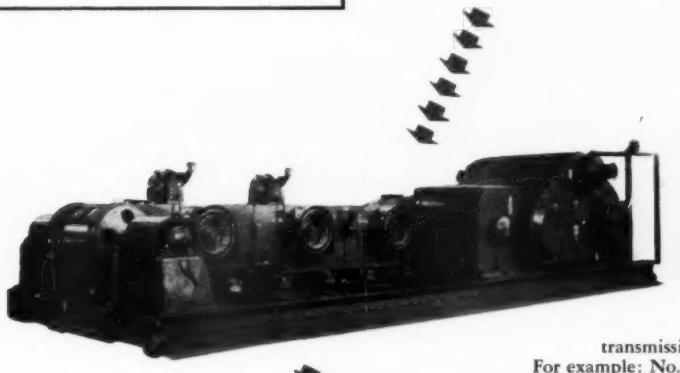
800 h.p. Skid-Mounted Rig!

ONE-PACKAGE . . .
flat-set skid-mounted
GB-800

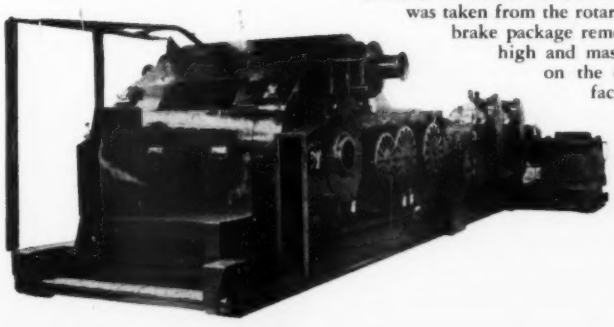
TWO-PACKAGE . . .
single-step GB-800



In Line and Individually Driven Pump Drives. This view shows the double pump drives located at the back of the compounding transmission. The pumps may be driven simultaneously at different speeds. Their position eliminates the need for notching the substructure or using belt idlers, and permits mounting the two pumps in line, simplifying manifolding.



Easier, Faster Engine Installation. Use of Airflex clutches eliminates mechanical connections between the engines and transmission, simplifying the removal and installation of the engines. During this operation it is not necessary to disturb oil lines, air lines or chains. Once aligned, no realignment of the engines is required. Many power flow combinations are possible when a 3-engine, 2-pump compounding transmission is used, such as is pictured here. For example: No. 2 and No. 3 engines may be used, separately, to drive their respective pumps at different speeds, or may be compounded to drive either pump or both pumps.



Clutches Positioned for Easier Maintenance. This photograph was taken from the rotary side, with the Emsco auxiliary brake package removed. It shows the rotary, drum high and master direct air clutches mounted on the outboard ends of the shafts to facilitate maintenance. Also shown is the auxiliary washdown pump drive, provision for driving the Thyrite generator, and the three Emsco herringbone gear-type oil pumps used in pressure lubrication system.

Printed in U. S. A. Adv. No. 110-51

O·C·T NOW PROVIDES A DEPENDABLE SUPPLY OF GUARANTEED QUALITY API RING GASKETS

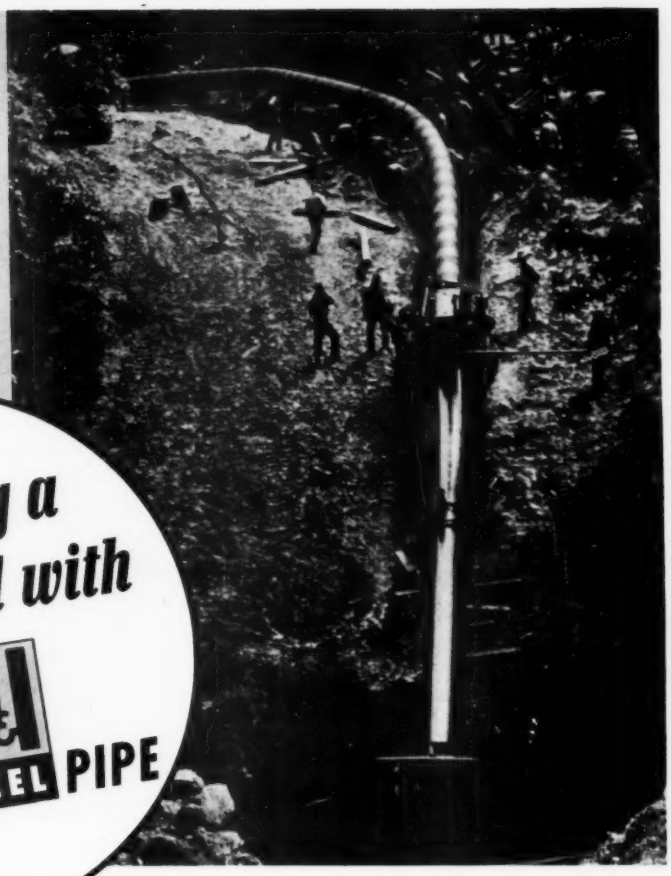
Oil Center Tool . . . one of the recognized leaders in precision oil equipment manufacture . . . has recently equipped a completely new department for the exclusive manufacture of API "Soft Steel" Ring Gaskets. O-C-T API Ring Gaskets will be manufactured in a full range of sizes and pressures, produced to O-C-T's usual high standards—with the quality guarded and guaranteed by careful laboratory control. In addition, O-C-T API Ring Gaskets are micromatically inspected for assurance of true radius and close tolerance on pitch diameter. O-C-T Ring Gaskets are cadmium plated for extra protection against corrosion. Sealing surfaces are guarded against damage.

O-C-T Guaranteed Quality Ring Gaskets are now available through your regular sources of supply. Specify O-C-T Guaranteed Quality on your next order.

WRITE TODAY FOR YOUR FREE COPY OF THE O-C-T FLANGE DIMENSION BOOK; BASED ON API STANDARD 6B.

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas



Rounding a sharp bend with CF&I WELDED STEEL PIPE

Unusual bending and welding properties—inherent characteristics of CF & I Steel Pipe because of the extremely low carbon and manganese content—enable you to "fit-it-up" and "lower-it-in" easier and faster. And, the high tensile strength Carbon-Silicon plate from which CF & I Steel Pipe is made is produced entirely within our own plant—a *plus* feature that assures uniformly high quality.

CF & I Steel Pipe—the result of more than three generations of steel-making—is available in 24" through 36" O.D. in 40' lengths. Write for detailed information.

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CAREON AND STAINLESS-CLAD STEEL PLATES • FLANGED AND DISHED HEADS LARGE DIAMETER WELDED STEEL PIPE

SUCCESSOR TO THE WORTH STEEL COMPANY

CLAYMONT STEEL CORPORATION • Claymont, Delaware

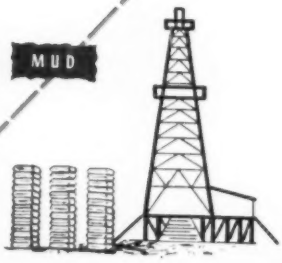
a subsidiary of CF & I—THE COLORADO FUEL & IRON CORPORATION

Our First Ten Years

1941 WAS THE YEAR OF...

40¢ STEAK

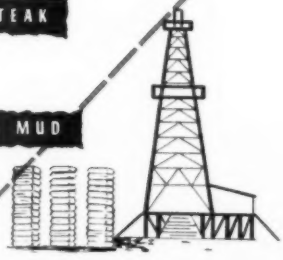
$40 MUD



1951 IS THE YEAR OF...

$2 STEAK

$30 MUD



A REPORT TO THE OIL INDUSTRY ON THE DRILLING MUD PICTURE BEFORE AND AFTER Magcobar's FIRST DECADE OF SERVICE .... *AT FAIR AND REASONABLE PRICES*

SINCE 1941

- ... the average total cost of drilling a well has increased more than 60%
- ... the wholesale price index for all commodities (food, clothing, shelter) is up 96.4%
- ... the average cost of a "low priced car" is up from about $850.00 to more than $2000.00
- ... the average price of crude oil at the well is up from $1.14 a barrel to more than $2.58 a barrel
- ... labor costs for drilling a well are up more than 70%
- ... the cost of drilling equipment is up 45%

YET THE COST OF DRILLING MUD IS STILL 20% BELOW THE 1941 LEVEL

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

Why, contrary to the upward trend in the price of nearly everything else since 1941, is the price of drilling mud still 20% *below* the 1941 average? Magcobar is the answer! When Magcobar entered the field ten years ago, the going price of mud weighting material was way up there above the $40.00 per ton figure. But, Magcobar posted the low but fair price of approximately $22.00 per ton in Gulf Coast fields . . . and the oil industry immediately received the first benefit from Magcobar's entry into the drilling mud picture. The history of Magcobar's climb in a span of only ten years to its position of prominence today in the highly specialized drilling mud business reflects the oil industry's wide acceptance of Magcobar's high quality products, good service and fair and reasonable prices. These *three things* are the foundation upon which Magcobar has been built. And with faith in its record of having established fair prices, better products and real service, Magcobar has again expanded its mines and plants in order to insure adequate supplies of mud material for future needs of the oil industry.

The full story of Magcobar's first ten years is available to you in a fully illustrated brochure. Write for your copy today.

MAGNET COVE BARIUM CORPORATION
ONE OF THE DRESSER INDUSTRIES
MALVERN, ARKANSAS HOUSTON, TEXAS

MAGCOBAR • MAGCOGEL • HIGH YIELD • MAGCO-FIBER • XACT CLAY • FIBER SEAL • SALT GEL • MAGCO-PHOS • RED OX • MAGCO-MICA • TANNATHIN
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NOW STANDARDIZED

3 Precision Controls for All Speed Problems

Here's governor standardization that "pays off". Now you can economically solve all speed-control problems with only three basic governors.

Costly special engineering is eliminated. Advanced design gives an unusual degree of flexibility... with precise speed control for all steam conditions. Results? Initial costs are lower... shipments are quicker... spare-parts inventory is reduced.

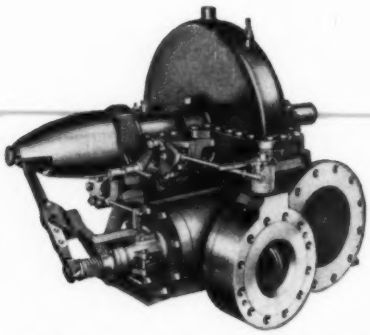
Designs for three basic classes of steam conditions, three wheel sizes, and three types of governors provide, in effect, twenty-seven standard variations to cover a wide range of applications. All oil-governed, direct-connected Type E units include the standard reservoir-type base, as illustrated. What's more, Type E governors can meet a great number of special requirements with optional accessories. This standardization results directly from Westinghouse's wide experience in all industry.

Other outstanding maintenance-saving features on the Type E turbine are Dual Protection... Weather Protection... Centerline Support... and a Rugged Governor Housing. Ratings are available from 5 to 1,500 hp.

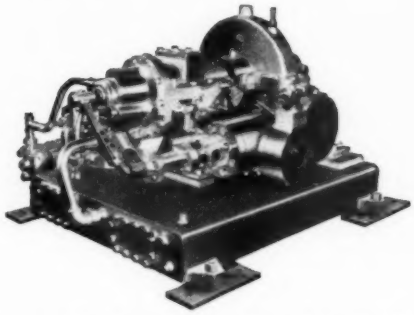
For complete information ask your nearby Westinghouse representative for Type E Turbine Book B-3896, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE.. IF IT'S Westinghouse

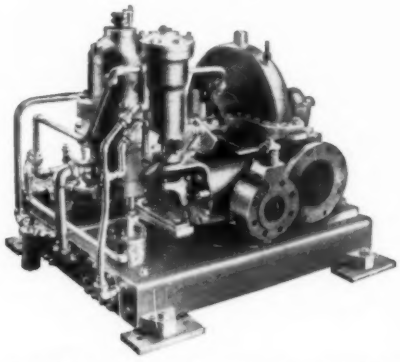
TYPE E Turbines



Shaft-Type Governor. For narrow speed-range applications, this governor automatically positions the steam admission valve to control turbine speed within close limits—*6 to 8% speed regulation.*

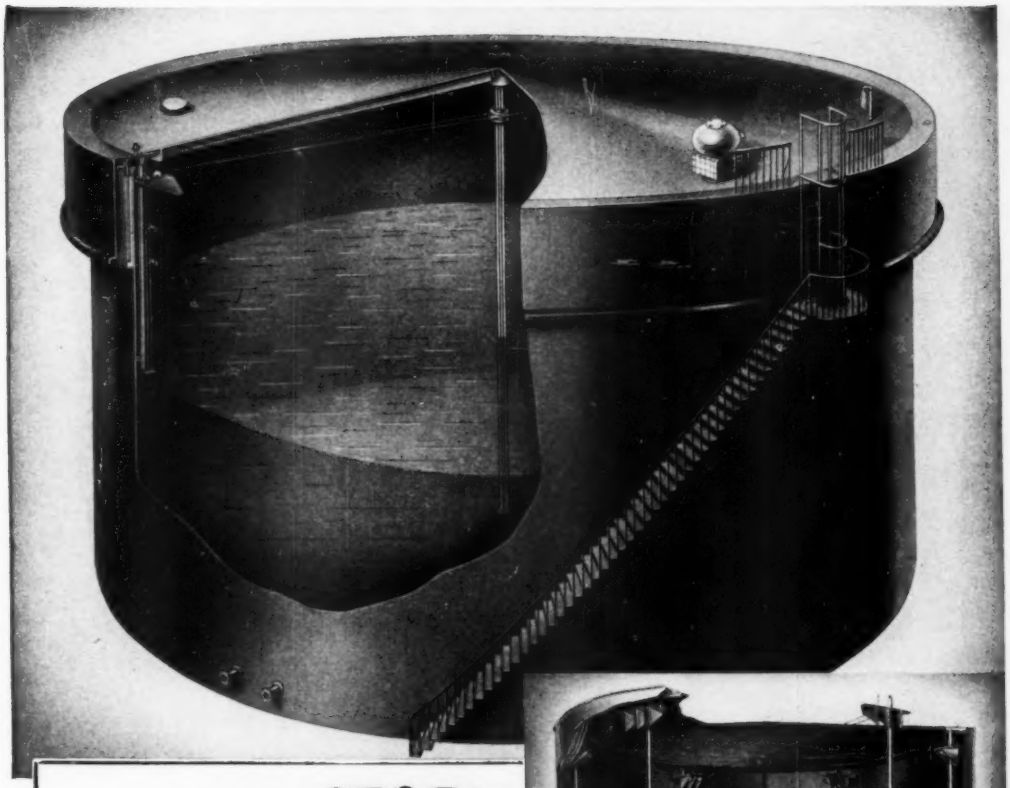


Hydraulic-Orifice Governor. For wide speed-range applications such as drives for fans, blowers, and compressors *—3-to-1 speed-adjustment range; 6% speed regulation.*



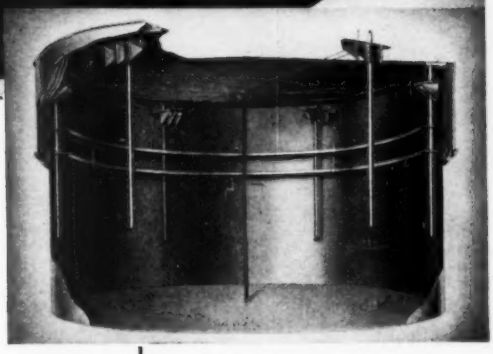
Vertical Oil-Relay Governor. For narrow-range precision-control applications such as drives for generators, pumps, blowers and compressors—$33\frac{1}{3}$% *speed-adjustment range; 4% speed regulation.*

J-50527



INSIDE STORY

ON VAPOR-SAVING WITH THE GRAVER EXPANSION ROOF



Cut-away for your inspection is this Graver Expansion Roof Tank. Here you see the details of its operation which dependably conserves the volatile elements of gasoline . . . so critically important today! This Graver design—approved by Underwriters' Laboratories—has a record of unfailing operation throughout the petroleum industry during the decade since it was first introduced.

Inset above shows mechanism by which *all-weather* stability is attained in the Graver Expansion Roof. The functional perfection of this design keeps *Conservation at Work* day and night in any climate . . . all year 'round.

FABRICATED PLATE DIVISION

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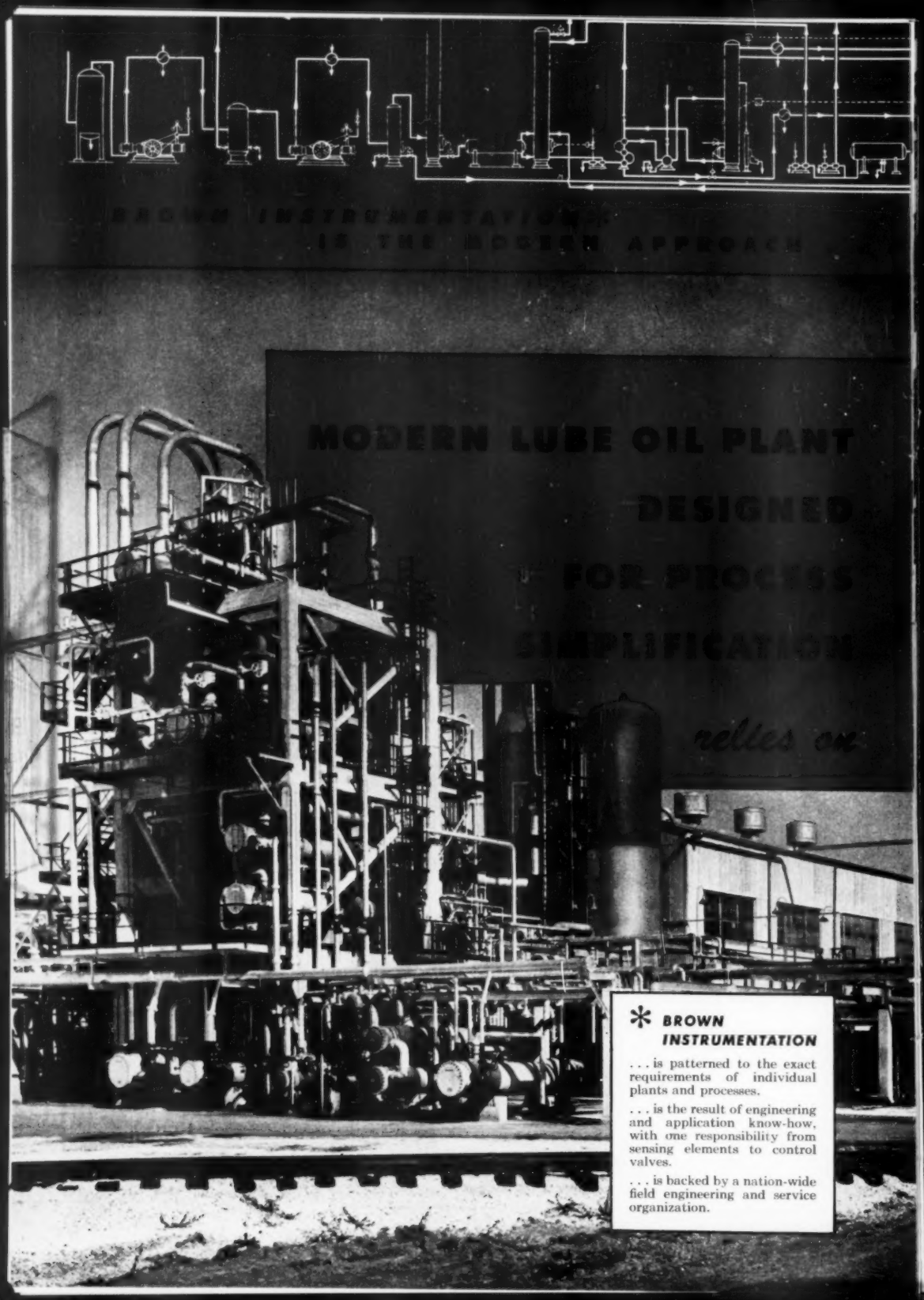

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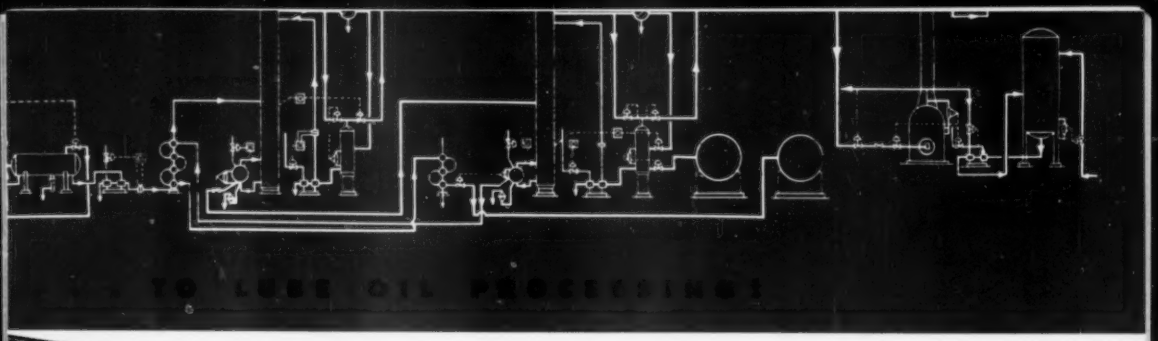
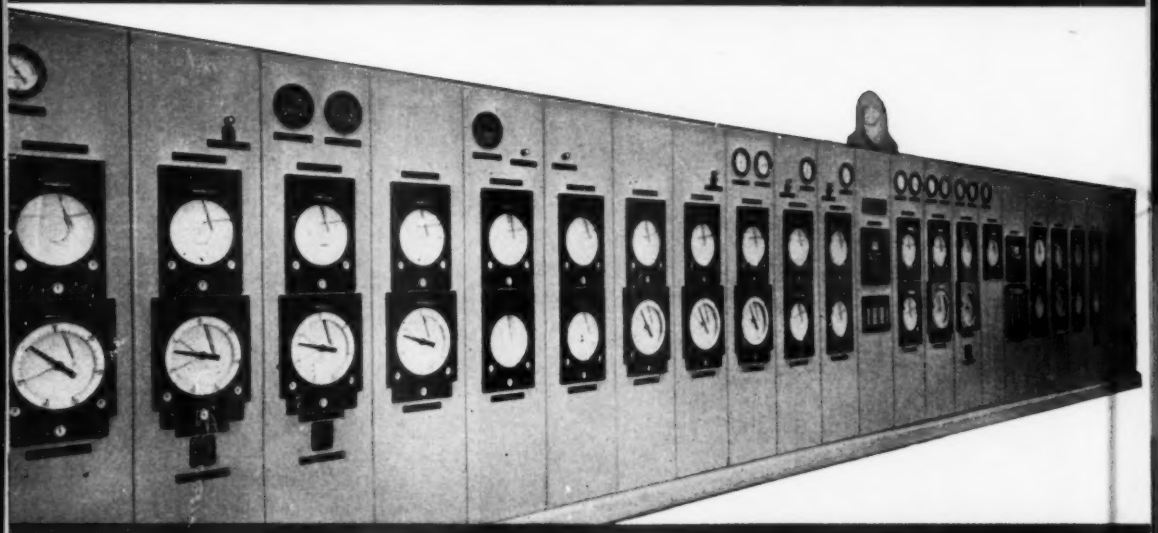
. . . is patterned to the exact requirements of individual plants and processes.

. . . is the result of engineering and application know-how, with one responsibility from sensing elements to control valves.

. . . is backed by a nation-wide field engineering and service organization.





. . . BROWN INSTRUMENTS AND CONTROLS

THE latest engineering advances are incorporated in the lube oil processing plant at the modern Cit-Con refinery at Lake Charles, La.—jointly owned and operated by Cities Service Company and Continental Oil Company.

This pace-setting operation . . . a typical Lummus "ahead-of-time" achievement incorporating a Max B. Miller Duo-Sol Unit . . . is attaining a new high in simplified processing, through modern instrumentation.

Almost 800 Brown instruments and more than 400 diaphragm motor valves effect uniform day-after-day regulation by automatically controlling every critical process variable.

In the engineering stage of automatic recording and controlling instrumentation for your own lube oil plant, or *any refining operation—consider first:*

- *The Brown know-how developed through many years of application experience in the industry.*
- *The completeness of the Brown modern approach — recorders, controllers, panelboards, valves, and all accessories.*

Call in our local engineer for a detailed discussion of your process requirements . . . he is as near as your phone. Offices in more than 80 principal cities of the United States, Canada and throughout the world. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

DESTINATION U. S. A.

It takes a lot of steel pipe to keep the wheels of industry turning in normal times—*more* when the No. 1 industrial country of the world becomes the arsenal of Democracy. That's why you'll find Wheatland Pipe, in greater quantities than ever before, en route to farms and factories, plants and mills all over the U. S. A. We at Wheatland are proud of the part played by the "pipe with the yearmark" in contributing to the health, comfort, *and security of the nation.*

-pipe with the yearmark!

WHEATLAND TUBE COMPANY

BANKERS SECURITIES BLDG., PHILADELPHIA 7, PA.

NEW JENKINS VALVES for Safety and Economy in L.P.G. Services

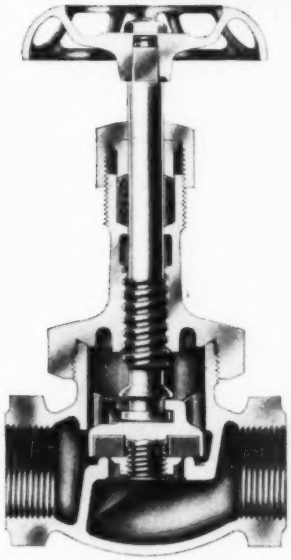


Fig. 506 Bronze Globe
400 lbs. O.W.G. ¼" to 2"

Fig. 507 Bronze Check
400 lbs. O.W.G. ¼" to 2"

Fig. 508 Bronze Angle
400 lbs. O.W.G. ¼" to 2"

APPROVED BY UNDERWRITERS' LABORATORIES,

SPECIAL DESIGN FEATURES

provide high strength and trouble-free, tight closure to meet all tests

EXTRA HEAVY, REINFORCED BODY. Liberally proportioned construction, with reinforcing rib along center line, and heavy lug ends. Will take all ordinary pipe strains without distortion, and provides a factor of safety far above any L.P.G. service needs.

CROWNED SEAT Insures positive tightness required to meet N.B.F.U. test of 500 p.s.i. under seat when valve is closed.

IMPROVED COMPOSITION DISC Meets every test of L.P.G. service. Retains resilience through entire range of liquid and gaseous phases from −50 F. to +150 F.

DEEPER PACKING BOX. Extra deep packing box and spiral, lubricated packing material permits spindle to turn with minimum friction. Dependable seal at this point and at valve seat is assured without excessive effort on handwheel.

BEVELED SPINDLE SHOULDER Back seats against corresponding bevel at bottom of bonnet when valve is full open. Relieves pressure on packing material.

ALL OTHER PARTS SPECIALLY DESIGNED and proportioned to meet rigorous requirements of critical L.P.G. service. Construction features of Fig. 507 Check and Fig. 508 Angle same as Fig. 506 Globe.

Sold Through Leading Distributors Everywhere

Liquified Petroleum Gas (butane-propane), commonly known as "bottle gas", has become a popular domestic fuel, and is now being widely used in industry. Piping systems for handling these gases must be controlled by valves specially designed for this hazardous service.

These new Underwriters' Approved Jenkins Valves for L.P.G. service offer strength and safety well beyond specified requirements. They are built to the same quality standards that make all Jenkins Valves the economy-wise choice for any service.

Where Gate Valves are required for L.P.G. service, Jenkins Fig. 270-U offers the proper ratings.

Because of their superior safety features, Jenkins L.P.G. Valves are also recommended for air, gasoline, oil, and similar services where exceptionally rugged, specially tested valves are needed. For complete details and dimensions, get the new Jenkins L.P.G. Valve folder, Form 197. Use the coupon. Jenkins Bros., 100 Park Ave., New York 17, N. Y.

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

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The complete line of JENKINS L.P.G. VALVES are described in this new folder. Mail coupon today.

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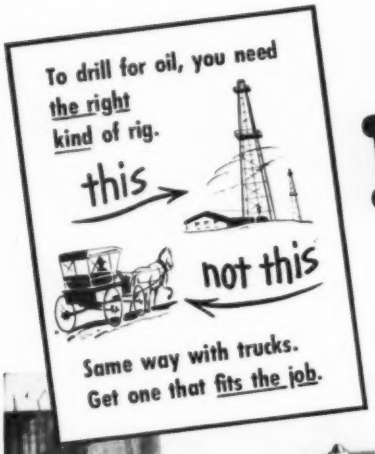


Dependable DODGE TRUCKS are "Job-Rated" for extra power

Switch to Dodge "*Job-Rated*" trucks and get more power for your off-the-highway operations—plus top performance and top economy!

New Dodge "*Job-Rated*" trucks are the most powerful in Dodge history. You get better-than-ever hauling efficiency because of power increases up to 20%. For example, the twin carburetion and exhaust system on big 145-hp. 3-ton models gives you added power with greater economy.

You can move bigger loads, too—with either 4- or 6-wheelers. You get new comfort—plus new handling ease on and off the road. On top of all this, you get famous Dodge *dependability* in a rugged truck that's built to stay on the job and out of the shop.

See how much you'll save with a powerful Dodge truck that's "*Job-Rated*" for your hauling jobs. See your Dodge dealer.

How Dodge trucks are "*Job-Rated*" for oil field and refinery hauling jobs

A Dodge "*Job-Rated*" truck is engineered *at the factory* to fit a specific job . . . save you money . . . last longer.

Every unit from engine to rear axle is "*Job-Rated*"—factory-engineered to haul a specific load over the roads you travel and at the speeds you require.

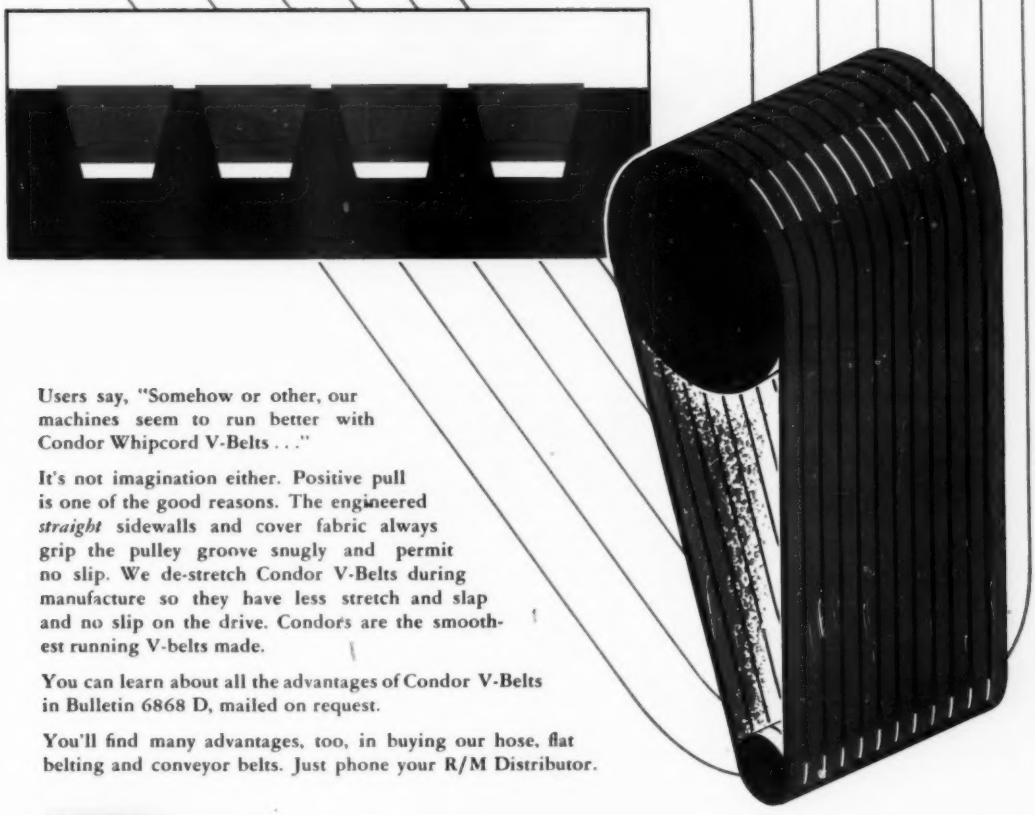
Every unit that SUPPORTS the load—frame, axles, springs, wheels, tires, and others—is engineered right to provide the strength and capacity needed.

Every unit that MOVES the load—engine, clutch, transmission, propeller shaft, rear axle, and others—is engineered right to meet a particular operating condition.

"Job-Rated" TRUCKS DO THE MOST FOR YOU

Condor V-BELTS

GRIP THE GROOVES



Users say, "Somehow or other, our machines seem to run better with Condor Whipcord V-Belts . . ."

It's not imagination either. Positive pull is one of the good reasons. The engineered *straight* sidewalls and cover fabric always grip the pulley groove snugly and permit no slip. We de-stretch Condor V-Belts during manufacture so they have less stretch and slap and no slip on the drive. Condors are the smoothest running V-belts made.

You can learn about all the advantages of Condor V-Belts in Bulletin 6868 D, mailed on request.

You'll find many advantages, too, in buying our hose, flat belting and conveyor belts. Just phone your R/M Distributor.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Chemicals you live by

HEADING: SW

Home-grown basic chemicals are one good reason for the growth of industry in the Southwest. Caustic soda, chlorine, sodium silicates—these are among the most essential chemicals for the production of crude oil, high-octane gas, hydrocarbons and a host of other products.

DIAMOND ALKALI has set its course Southwest to provide a nearby source of these and other chemicals. In gearing our plants, production and services to the needs of that region, we are growing with it.

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Oklahoma City and Houston. Also representatives in principal cities.

★

Bicarbonate of soda
Carbon tetrachloride
Caustic soda
Chlorinated paraffins
Chlorine
Chromates
Muriatic acid
Precipitated calcium carbonates
Sodium silicates
Soda ash
Special chemicals

★

DIAMOND ALKALI COMPANY

DIAMOND ALKALI COMPANY • CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

MACK TRUCKS ... for All-Out Effort

● Today's all-out effort in National Defense and civilian supply places an ever-increasing strain on truck equipment. Fact is, up to 75% of all incoming and outgoing materials at the nation's defense plants are now hauled on motor trucks.

Under such emergency conditions "Built Like A Mack" takes on added significance . . . means trucks that stand up better under the punishing wear and tear of bigger loads and more intensive service.

Wherever they operate . . . in whatever phase of the national economy . . . Mack trucks have one thing in common. Being Macks—they're built to outlast them all—to give *long-lasting* economy and reliability. That's a basic Mack advantage, vitally important during periods of uncertainty when replacements may be difficult to obtain.

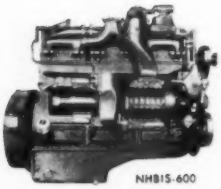
Your nearest Mack branch or distributor has the right Mack for your particular line of business—a truck that's built better to give you benefits in low-cost maintenance and peak performance for many years to come.

Mack TRUCKS

. . . outlast them all

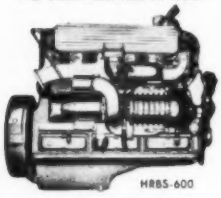
Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Rigorous oil field service is one more job where Mack trucks show at their best in extra strength and stamina, extra performance and extra dependability.



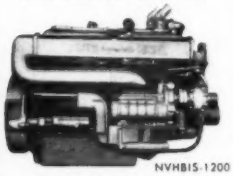
NHBIS-600

275 hp, 2100 rpm Cummins industrial Diesel. Ross lube oil cooler.



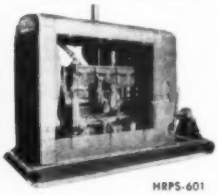
HRBS-600

225 hp, 1800 rpm Cummins automotive Diesel. Ross lube oil cooler.



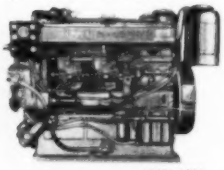
NVHBIS-1200

550 hp, 2100 rpm Cummins industrial Diesel. Ross lube oil cooler.



HRPS-601

225 hp, 1800 rpm Cummins Diesel power unit, with structural steel base. Ross lube oil cooler.



NVHI-1200

400 hp, 2100 rpm Cummins industrial Diesel. Ross lube oil cooler.

PRECISION STANDARDS OF

WARRANTEED CUMMINS DIESELS

DEMAND "EXTRAS" FROM COMPONENTS

more than measure up!

"Built not once but *Twice*," is more than a slogan with Cummins. Every engine undergoes a complete rebuilding and retesting, after the first assembly has been disassembled for close inspection of all parts, following initial run-in on the test block.

This one example of the extra care and precision-workmanship that go into every Cummins Diesel is an example also of the demands which Cummins Engine Company, Inc. must necessarily make on all its components. For, in promising "the finest of engine craftsmanship, inbuilt ruggedness" and providing a warranty for one year or 100,000 miles, whichever first occurs, it's easily seen why Cummins has to be extremely prudent in its selection of so vital a component as an exchanger. *Oil and water temperatures must be closely guarded!*

So, the fact that Ross lubricating oil and jacket water coolers are utilized by Cummins is certainly conclusive proof of their dependability . . . likewise, an acknowledgment that the well known Ross qualities of thorough testing, large factor of safety, compactness and standardization jibe with the Cummins qualities of dependable profit-making performance, simplified service, interchangeability of parts and minimum downtime.

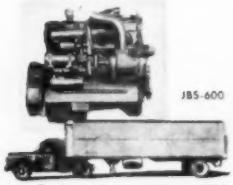
Consult Ross engineers for standardized exchangers serving engines of *any* rating. Request literature for design details.

ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1417 WEST AVENUE BUFFALO 13, N. Y.

In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

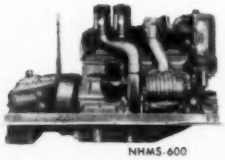


JBS-600

Tractor-trailer and 150 hp, 2500 rpm Cummins Truck-Bus Diesel. Ross lube oil cooler.

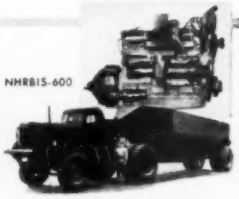
LRM-600

300 hp, 1100 rpm Cummins marine Diesel. Ross lube oil cooler.



NHMS-600

275 hp, 2100 rpm Cummins marine Diesel. Ross lube oil and jacket water coolers.



NHRBIS-600

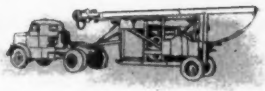
Coal hauler truck and 300 hp, 2100 rpm Cummins Diesel. Ross coolers for engine lube oil and torque converter fluid.

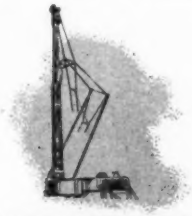
Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Bucyrus-Erie Spudders
SPEED DRILLING 3 WAYS

1. FAST TRAVEL FROM JOB TO JOB. Bucyrus-Erie rigs — either mobile semi-trailer, tandem axle or skid-mounted type for moving on platform trailers — are compact units . . . can travel over the road at normal highway speeds. This means more time on the job, greater profits for you.





2. FAST SET-UP, FAST KNOCK-DOWN. Telescoping derrick is raised or lowered quickly by a built-in power hoist driven by a self-locking worm gear. Tubular braces unfold smoothly . . . are secured by attaching just ten bolts. These advantages mean Bucyrus-Erie spudders are producing while other units are still being assembled.

3. FAST, DEPENDABLE OPERATION. With Bucyrus-Erie rigs, you get fast, snappy drilling action — the kind that adds extra feet of hole every hour, prevents costly fishing jobs, lowers cable costs. Unique spudding motion lets the beam "get out from under" the drill line, permits fast, free drop of the tools. Accurate control means easy handling of a wide variety of jobs. 84551

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

FOUR MODELS TO CHOOSE FROM:

	Top to Bottom	Workover
48-L	6000 ft.	7000 ft.
36-L	3500 ft.	5000 ft.
28-L	2500 ft.	3500 ft.
24-L	1500 ft.	2500 ft.

See or Write Your BUCYRUS-ERIE SPUDDER DISTRIBUTOR

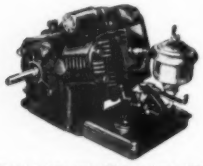
BEACON SUPPLY CO. - - - - - - Borger and Pampa, Texas
BECKWITH MACHINERY CO. - Pittsburgh, Clearfield and Bradford, Pa.
BUCKEYE SUPPLY COMPANY - - Zanesville and Wooster, Ohio; El Dorado and Chase, Kan.
DRILLERS SUPPLY CO. - - - - - - - - - - Joplin, Mo.
DRILLING & MINING EQUIPMENT CO. - - Los Angeles 21, Calif.
GREAT NORTHERN TOOL & SUPPLY CO. - - Billings, Kevin and Cut Bank, Mont.; Casper, Wyo.
IVERSON SUPPLY CO - Oklahoma City, Okmulgee and Tulsa, Okla.; Ft. Worth, Kermit, Odessa, Snyder, Houston and Midland, Texas; Artesia and Farmington, N. M.
LUCEY EXPORT LTD. - - - - - Calgary and Edmonton, Alta.
THE McJUNKIN SUPPLY CO. - - Charleston, W. Va.; Allen, Ky.
OLYMPIC SUPPLY CO. - - - - - - - - - Seattle, Wash.
RANDALL-ZOGG SUPPLY CO. - - - - - - - Princeton, Ind.
THE STRAKER SUPPLY - - - - - - - - Mt. Pleasant, Mich.
TILLSONBURG PIPE & SUPPLY CO. - - - - - Tillsonburg, Ont.

BUCYRUS ERIE *First* with the *Finest* in Spudders

... Save by Standardizing...
ON
CONTINENTAL RED SEAL POWER

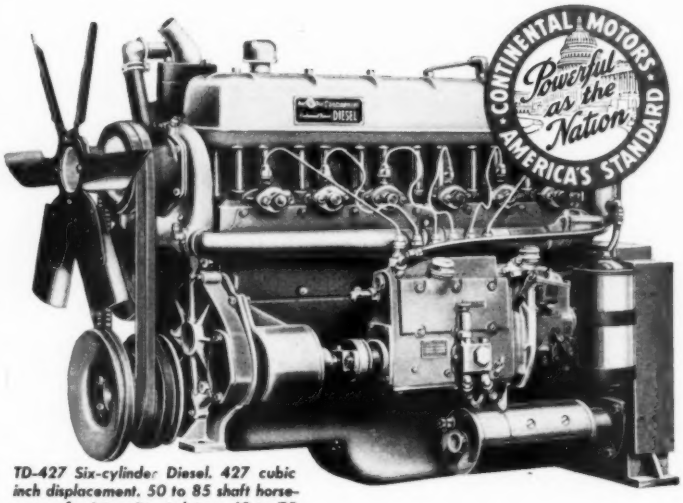
In the petroleum industry, as elsewhere, Continental Motors' light air-cooled industrial models are finding their way into more and more jobs where *dependability* counts. They combine easy starting, long trouble-free life, and capacity to deliver power in excess of their ratings—and they deliver exceptionally high torque at low speeds. Pumps, compressors, and small standby generators are only three of the many field uses in which they excel.

Models marked * are also available with 8 cubic inch displacement developing 2½ h. p. at 3600 r. p. m.



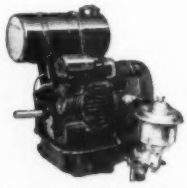
AC5 (¼-1 h.p.) and **AC6** (1½ h.p.). Ultra-low profile models with suction-type carburetor and underslung fuel tank. Height 9½ inches over-all.

AU7 (1½ h.p.) and **AU7-B*** (2 h.p.). For applications where lateral space is limited.



TD-427 Six-cylinder Diesel. 427 cubic inch displacement. 50 to 85 shaft horsepower for intermittent duty — 40 to 75 shaft horsepower for continuous duty.

Experience of users in various phases of oil field operations—drilling, processing and distribution alike—points to one big fact that's extra important today: it pays off in dollars and cents to standardize on Red Seal power. • • • • It simplifies service, for one thing. Numerous Continental parts are interchangeable from model to model, so you don't have to maintain large inventories for replacement. And even more important in its long-range results is the careful engineering of every Red Seal to its work. • • • • The Continental Red Seal line is broad and diversified. There are air-cooled industrial models from ¾ to 2½ h.p., and liquid-cooled models—L-head and valve-in-head—for almost every oil field use. They are built to hundreds of different specifications to meet precise requirements of their work, and can be had for operation on all standard fuels. • • • • Engineering guidance to match the power plant to your job is available in all oil-producing areas. Sales, parts and service facilities everywhere.



AA7 (1½ h.p.) and **AA7-B*** (2 h.p.). For applications where vertical space is limited.

PRODUCTS OF SPECIALIZED EXPERIENCE DATING FROM 1902

Continental Motors Corporation
MUSKEGON, MICHIGAN

6218 CEDAR SPRINGS ROAD
DALLAS 9, TEXAS

3817 S. SANTA FE AVENUE
LOS ANGELES 58, CALIF.

Points the finger at hidden fires . . .

Slow-burning fires may smolder for hours before they generate enough heat to set off fire detecting devices. But they can be spotted within a few seconds by a *Kidde* smoke detecting system.

A single *Kidde* Multi-line Smoke Detector System can protect one room or many rooms in the same building. A central electronic control board tells the exact location of the fire—and transmits a warning to your fire control headquarters or the local fire department.

You can combine this efficient *Kidde* Smoke Detector System with a *Kidde* CO_2 Fire Extinguishing System. See your nearest Kidde representative or write for full information.

Kidde

Walter Kidde & Company, Inc., 554 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada, Limited, Montreal, P. Q.

Only genuine RIGID guarantees economy

If this Housing ever Breaks or Distorts we will replace it Free
RIGID
HEAVY DUTY
This Work-Saver RIGID assures you..."No pipe wrench housing repair expense."

• You'll find no substitute for the smart-working long-lasting qualities that have made the RIGID the world's most popular pipe wrench. Breakproof housing, full-floating hookjaw with handy pipe scale, replaceable heeljaw, adjusting nut that spins easily in all sizes, 6" to 60", comfort-grip handle —these plus the RIGID name mean more service and tool satisfaction for your money. Buy at your Supply House.

RIGID

★ Work-Saver Pipe Tools ★

THE RIDGE TOOL CO. • ELYRIA, OHIO

They Say—

Europe's Auto Lesson

"The story of the remarkable automotive development in this country has been the story too of fair, intelligent taxation. . . .

"In recent years, however, taxes have steadily climbed until today they take 24 cents out of every automotive dollar. Taxes on gasoline today amount to one-third of the retail price.

"How far can this dangerous trend progress before a large segment of the population is priced out of the market, production crippled and the automobile returned to its former status as a luxury product? A lesson can be learned from Europe's experience. If carried to excess, the very purpose of automotive taxation can be defeated, to the accompanying hardship of the country and its people."

Tax Economics Bulletin.

Gas Export vs. Price Fixing

"However much I feel the Texas economy is being plundered of its economic birthright, I cannot agree . . . that this commission has the authority to fix prices."

Olin Culberson, chairman, Texas Railroad Commission, speaking in Austin.

Iranian Parallel?

"In nationalizing the tidelands, our federal Government is doing to the states exactly what Iran is doing to the British lease owners, and danger lurks in nationalization of state resources here at home as much as abroad."

Price Daniel, Texas attorney general, in a letter to Sen. Joseph C. O'Mahoney.

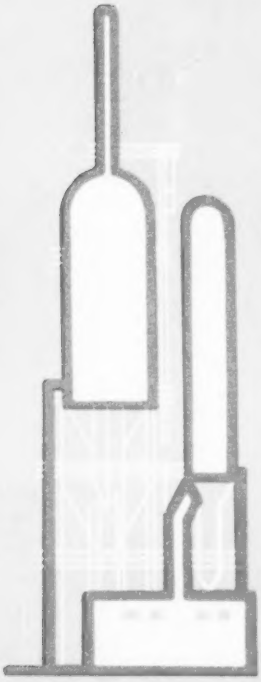
Coming Into Its Own

"The future of the chemical industry in the Southwest appears particularly bright. Should the experience of the past decade be a yardstick of the advances to be made in the future, far greater diversification will be obtained.

"The development of synthetic fibers, detergents, fertilizers, insecticides and fungicides, pharmaceuticals and biological chemicals, and nonmetallic mineral processing presage an era of unusual growth and progress."

Dr. Frank W. Jessen, consulting engineer, Austin, Tex., Area Economic Development Foundation, addressing the Division of Industrial and Engi-

fluid catalytic cracking



NOW

model IV

Possessing all the process and operating advantages of the basic "fluid" cracking principle and representing the lowest cost fluid unit per barrel output of high octane product with no sacrifice in engineering standards of safety and with improved operability and maintenance,—this truly new Standard Oil Development design, Model IV, is now available in any capacity to refiners,—anywhere in the world.

For further information, address your inquiries to:

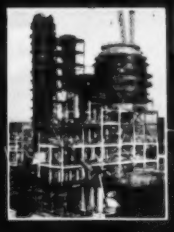
FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK

designers and builders of

fluid catalytic cracking units

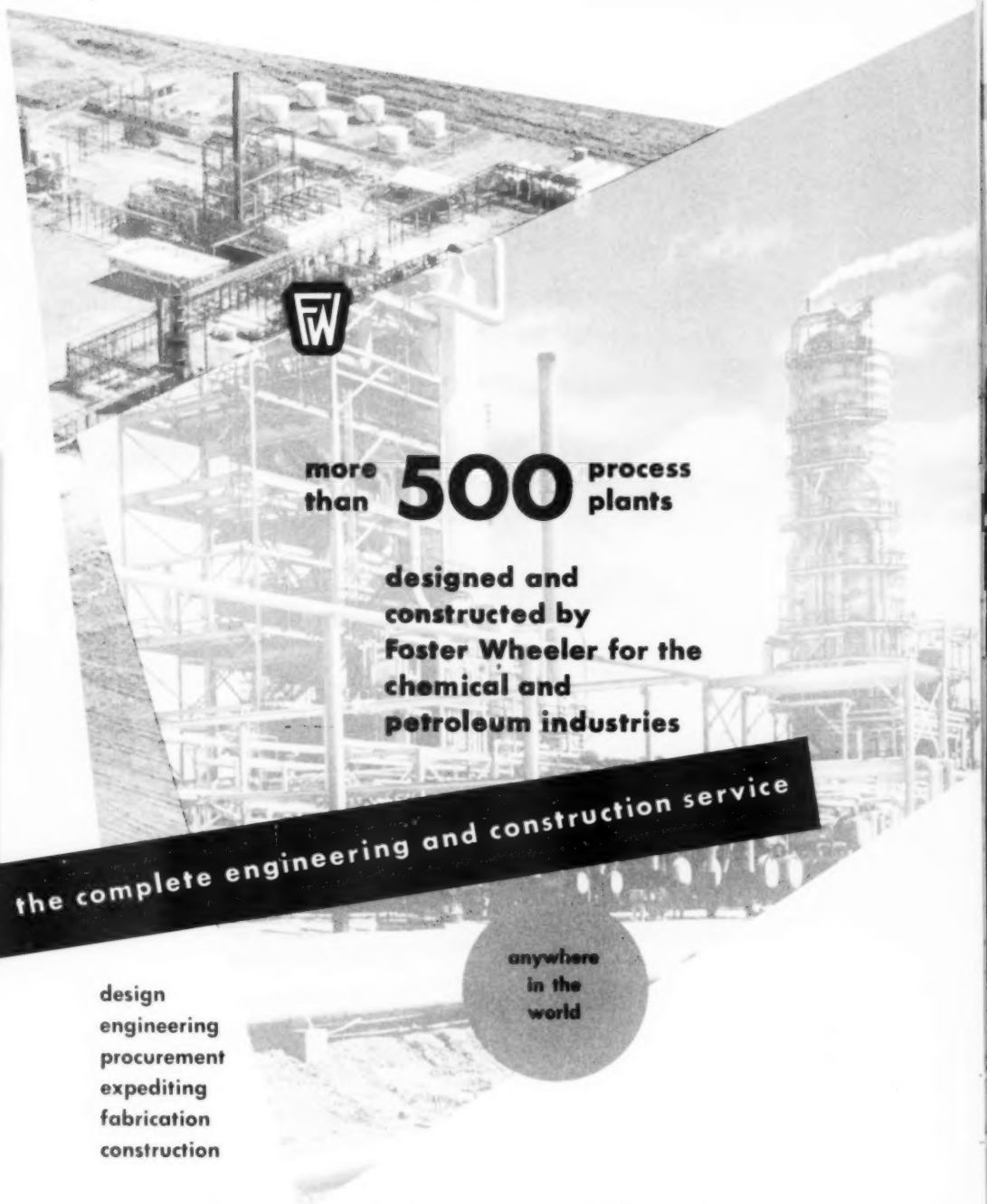
since 1941



now under construction by FW

built by FW in 1944

built by FW in 1941



more than **500** process plants

designed and constructed by Foster Wheeler for the chemical and petroleum industries

the complete engineering and construction service

anywhere in the world

design
engineering
procurement
expediting
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neering Chemistry of the American Chemical Society, Cleveland.

Lesson in Oil

"In 1914 Winston Churchill, the First Lord of the Admiralty, needed oil for the British Navy. With government funds he bought a controlling interest in Anglo-Iranian Oil Co. This emergency action on the eve of World War I set the stage for one of the remarkable acts of political irony in our time. It was an act where final consequences have yet to be played out.

"Iran's Parliament voted to nationalize the local oil industry, including Anglo-Iranian. Under ordinary circumstances this would have been only another legal expropriation of foreign investments by sovereign governments feeling a surge of power.

"This one is unique because it catches the Socialist Government of England in a trap of its own making. The British Foreign Office strongly protested to Teheran at the very time that the Minister of Supply was going ahead with nationalizing the steel industry in England itself.

"The English Socialist Government's own record makes its protest against Iran's right to nationalize her oil sound very thin. Somehow it is incredible to the British nationalizers that they should be asked to take their own medicine. The medicine, it seems, is not for the medicine makers."

Editorial in Business Week.

CALENDAR

May

Pennsylvanian Geology and Mineral Resources of Western Indiana, fifth annual field conference, sponsored by division of geology, Indiana Department of Conservation, and department of geology, Indiana University, Bloomington, Ind., May 11-13.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

Pacific Coast Gas Association, annual transmission (technical) conference, Bakersfield Inn, Bakersfield, Calif., May 16-17.

American Institute of Electrical Engineers, District 5 meeting, Loraine Hotel, Madison, Wis., May 17-19.

Empire State Petroleum Association, Inc., Hotel Statler, Buffalo, N. Y., May 20-22.

American Petroleum Institute, conference on products-pipe-line technology, Biltmore Hotel, Atlanta, May 21-23.

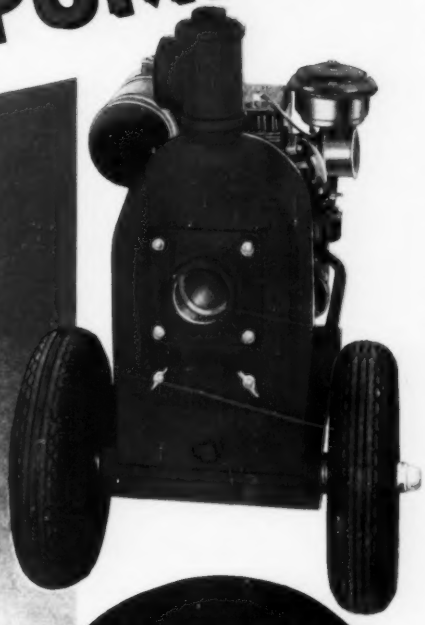
Intermountain Association of Petroleum Geologists, second annual field conference, Canyon, House, and Confusion range areas of Millard County, Utah; headquarters, Forrest Hotel, Nephi, Utah; May 23-26.

Second annual John Zink Process Heating Seminar, John Zink Co., 4401 South Peoria, Avenue, Tulsa, May 26.

American Petroleum Institute, Division of Marketing, midyear meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kur-

best for the job
• SELF PRIMING
• CENTRIFUGAL
McGOWAN PUMPS



These rugged McGOWAN all welded steel pumps are lighter, yet stronger, more durable than any you've ever seen. Now in operation in Oil Fields throughout the world. They feature — automatic priming • non-clogging impeller hardened wear plates • large access plates • tested and trouble free shaft seals.

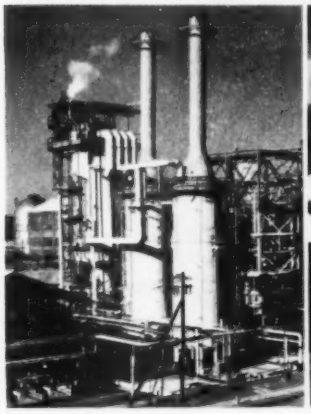
SINCE 1852
McGOWAN PUMPS

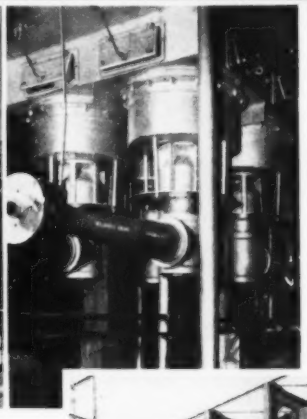
Long life service means extra economy! McGowan Pumps have been serving the industry since 1852. See your Supply Co. or write today for catalog sheets, complete information.

McGOWAN
LEYMAN MANUFACTURING CORP.
PUMPS
CENTRAL AVE. CINCINNATI 2, OHIO

McGOWAN PUMP DIV., Leyman Mfg. Corp.
58 Central Ave., Cincinnati 2, Ohio
Please send without obligation data on McGowan self priming centrifugal pumps.
COMPANY
NAME
ADDRESS

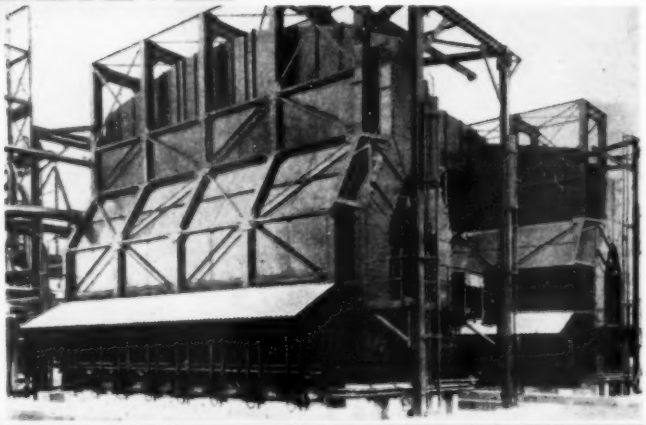
SPECIALISTS TO THE CHEMICAL-PETROLEUM INDUSTRIES





Large Petro-Chem heater equipped with four National Airoil Combination gas and oil Tandem Block Combustion Units for a liberation of up to 40 million B.T.U.'s per hour in one furnace with either gas or oil fuel.

Close-up of the burners while in operation and after three months without shut-down.



Showing two large, modern McKee Co. crude furnaces of the center wall up-draft type. Each furnace is equipped with sixteen National Airoil flat flame oil burner units for uniform heating of wall tubes. The burners fire directly upward and parallel with the bridge or center wall.

National Airoil Burner Co. are pioneers in successfully upfiring oil and combination oil and gas in stills, boilers, heaters and superheaters.

OIL & GAS BURNING EQUIPMENT FOR EVERY TYPE OF APPLICATION

For 39 years—continuously since 1912—NATIONAL AIROIL BURNER COMPANY has devoted its entire efforts to the design, development, manufacture and application of successful Oil & Gas Burning Equipment. This is particularly so in relation to the vast Chemical-Petroleum Industries, for which we have recently created a separate Division within our Company.

NATIONAL AIROIL BURNER COMPANY Equipment is used throughout the U. S. and foreign countries. Many models in varied sizes are available to cover a wide scope of applications and special problems. We know you will be interested in the full particulars we give regarding your oil-gas-sludge combustion requirements.

NATIONAL AIROIL BURNER CO., INC.

Main Offices & Factory: **1239 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.**

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

haus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, Division of Production, midyear meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

National Oil Scouts and Landmen's Association, annual convention, Hotel Beaumont, Beaumont, Tex., June 7-9.

Rocky Mountain Oil and Gas Association, midyear meeting, Henning Hotel, Casper, Wyo., June 8-9.

Liquefied Petroleum Gas Association, Inc., first annual Mountain States district convention and trade show, Troutdale-in-the-Pines, Evergreen, Colo., June 10-12.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

Petroleum Equipment Suppliers Association, annual meeting, Chateau Frontenac, Quebec, Canada, June 17-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

Kentucky Oil and Gas Association, annual meeting, Ventura and Henry Clay hotels, Ashland, Ky., June 21-22.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

July

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

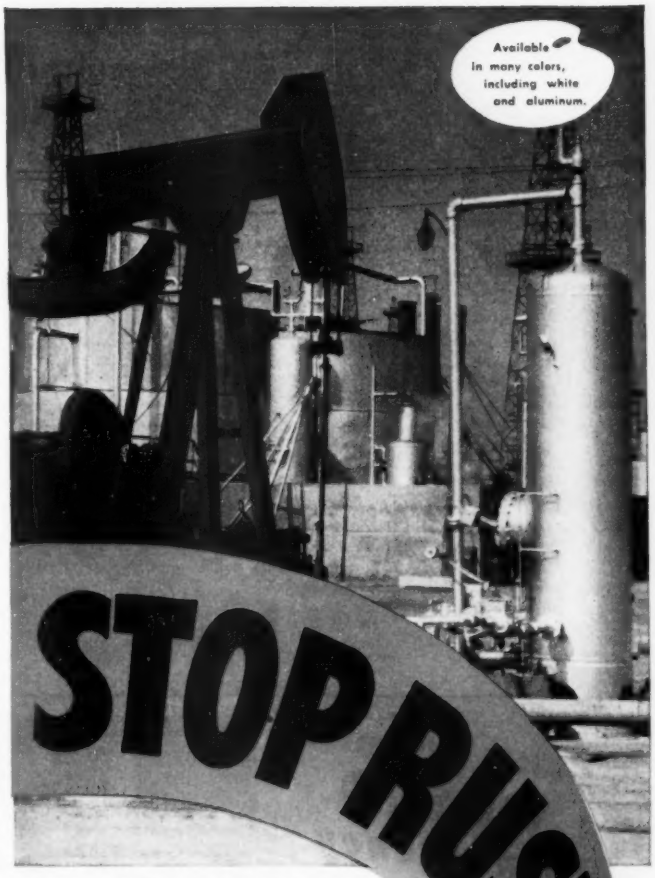
American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 21-23.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineer-



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ing conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indian... dependent Petroleum Association, fall ...nvention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

NOMADS

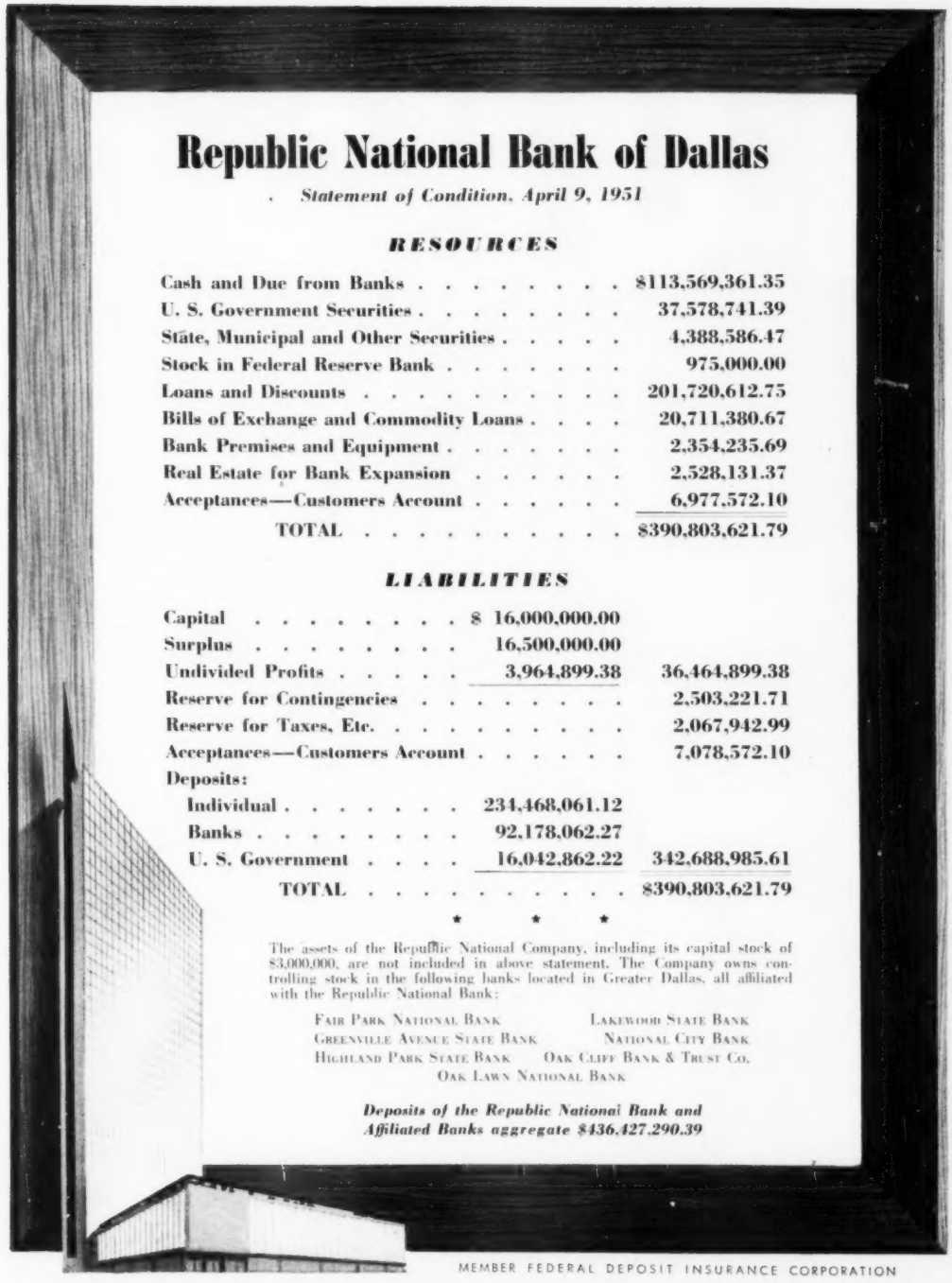
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.



Republic National Bank of Dallas

Statement of Condition, April 9, 1951

RESOURCES

Cash and Due from Banks	$113,569,361.35
U. S. Government Securities	37,578,741.39
State, Municipal and Other Securities	4,388,586.47
Stock in Federal Reserve Bank	975,000.00
Loans and Discounts	201,720,612.75
Bills of Exchange and Commodity Loans	20,711,380.67
Bank Premises and Equipment	2,354,235.69
Real Estate for Bank Expansion	2,528,131.37
Acceptances—Customers Account	6,977,572.10
TOTAL	$390,803,621.79

LIABILITIES

Capital	$ 16,000,000.00	
Surplus	16,500,000.00	
Undivided Profits	3,964,899.38	36,464,899.38
Reserve for Contingencies		2,503,221.71
Reserve for Taxes, Etc.		2,067,942.99
Acceptances—Customers Account		7,078,572.10
Deposits:		
Individual	234,468,061.12	
Banks	92,178,062.27	
U. S. Government	16,042,862.22	342,688,985.61
TOTAL		$390,803,621.79

* * *

The assets of the Republic National Company, including its capital stock of $3,000,000, are not included in above statement. The Company owns controlling stock in the following banks located in Greater Dallas, all affiliated with the Republic National Bank:

FAIR PARK NATIONAL BANK — LAKEWOOD STATE BANK
GREENVILLE AVENUE STATE BANK — NATIONAL CITY BANK
HIGHLAND PARK STATE BANK — OAK CLIFF BANK & TRUST CO.
OAK LAWN NATIONAL BANK

Deposits of the Republic National Bank and Affiliated Banks aggregate $436,427,290.39

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

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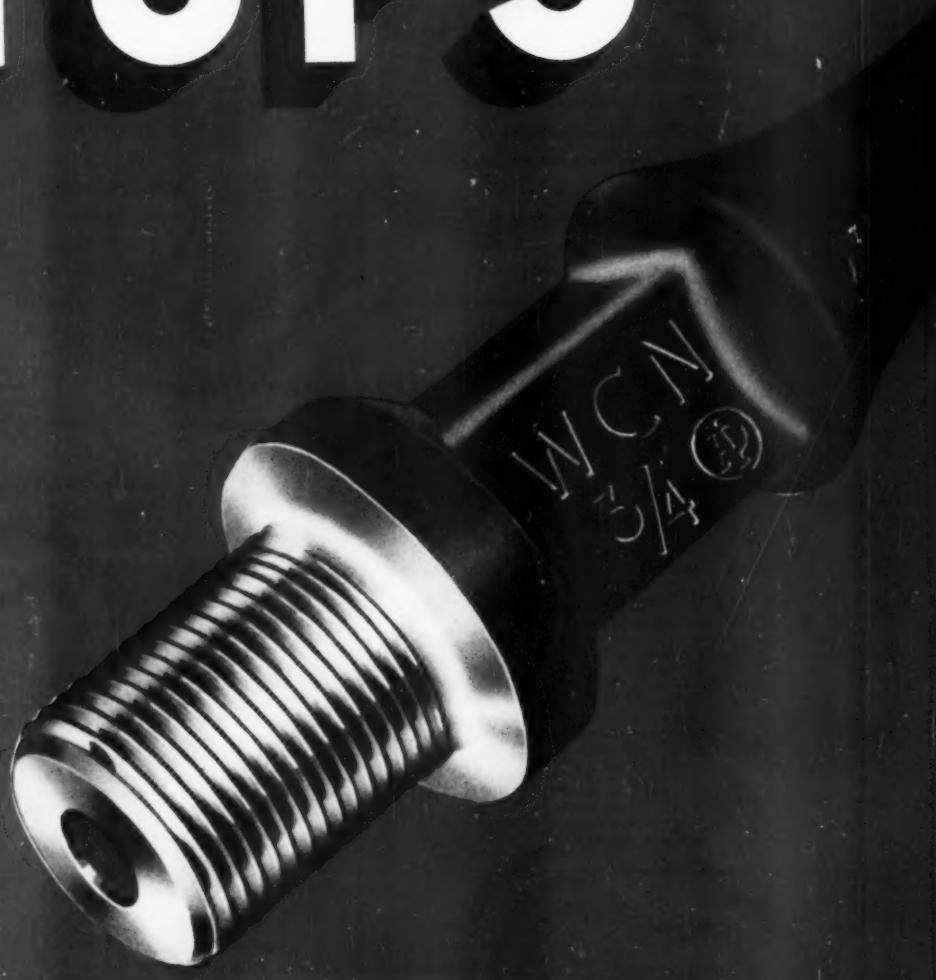

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JOURNALLY Speaking

Wearing o' the Green

DON'T pass over the little picture on this page too quickly. You've seen plenty of pictures of old timers being given presents at luncheons, but this one is different for three reasons:

1. The group is the Pen Pushers, a miscellaneous aggregation of Los Angeles oil writers, public-relations men, and kindred souls who manage to wangle a monthly lunch at the expense of some oil or supply company—a notable achievement in these days of high food costs and closely audited expense accounts.

2. The occasion is "Bill Green Day", in honor of W. E. (Bill) Green who has been an oil editor for 50 years. We never expect to hold on that long, ourself, so along with the Pen Pushers we take off our hat to this fabulous character. Starting with country weeklies in the Mid-Continent, Bill put in a long trick with the former Oil Weekly, and finally migrated to Los Angeles where he still publishes the "Green Sheet", a mimeographed news service on drilling in California.

On Bill Green Day, which was complete with green carnations, the Pen Pushers gave Bill a monogramed wallet full of some green stuff. The picture shows it being handed to him by George Tyler, regional manager of DuPont's petroleum-chemicals division, who signed the tab that day. (You should not need any left-to-right to tell which one is an oil editor and which one bought the lunch.)

3. The guest of honor is a brother of C. J. (Jack) Green, who has been our veteran linotype operator almost (it seems) as long as Bill has been an editor, a fact which ties the incident in with the Journal family. It's a small world, but may it always be a Green one.

Bing and Bob

HERE'S where Bing Crosby can hang one on Bob Hope in the long-standing and good-natured feud between these two Hollywood entertainers.

Bing is now officially and legitimately enrolled as a member of that very select group, subscribers to our favorite oil publication. The subscription is entered in the resounding name of Harry L. Crosby, Jr., Oil Ventures, which, the manager thoughtfully explained, is the title Der Bingle uses for his petroleum activities. Of course, the title alone wasn't enough, and our circulation manager held out until he received indisputable proof that Bing's Ventures actually is engaged in an oil operation.

The payoff is that Bob Hope also applied for a subscription and got turned down on the ground that his well-publicized Scurry County well represents simply a financial interest and does not make him an operating oil man. Hollywood glamor means nothing to our circulation manager; he hews strictly to the line.

From Mecca to Medina

OIL royalties of King Ibn Saud are financing extensive repair and refurbishing of the Great Mosque at Medina, Saudi Arabia, one of the oldest, most sacred, and most beautiful of the shrines of Islam. It was at the oasis of Medina that the Prophet Mohammed ended his Hegira from Mecca in 622, which became the beginning of the Moslem calendar. Pilgrimages of the Faithful have supported the building and maintenance fund ever since, but now oil is helping, showing that petroleum aids travel in more ways than one.

—*Henry D. Ralph*

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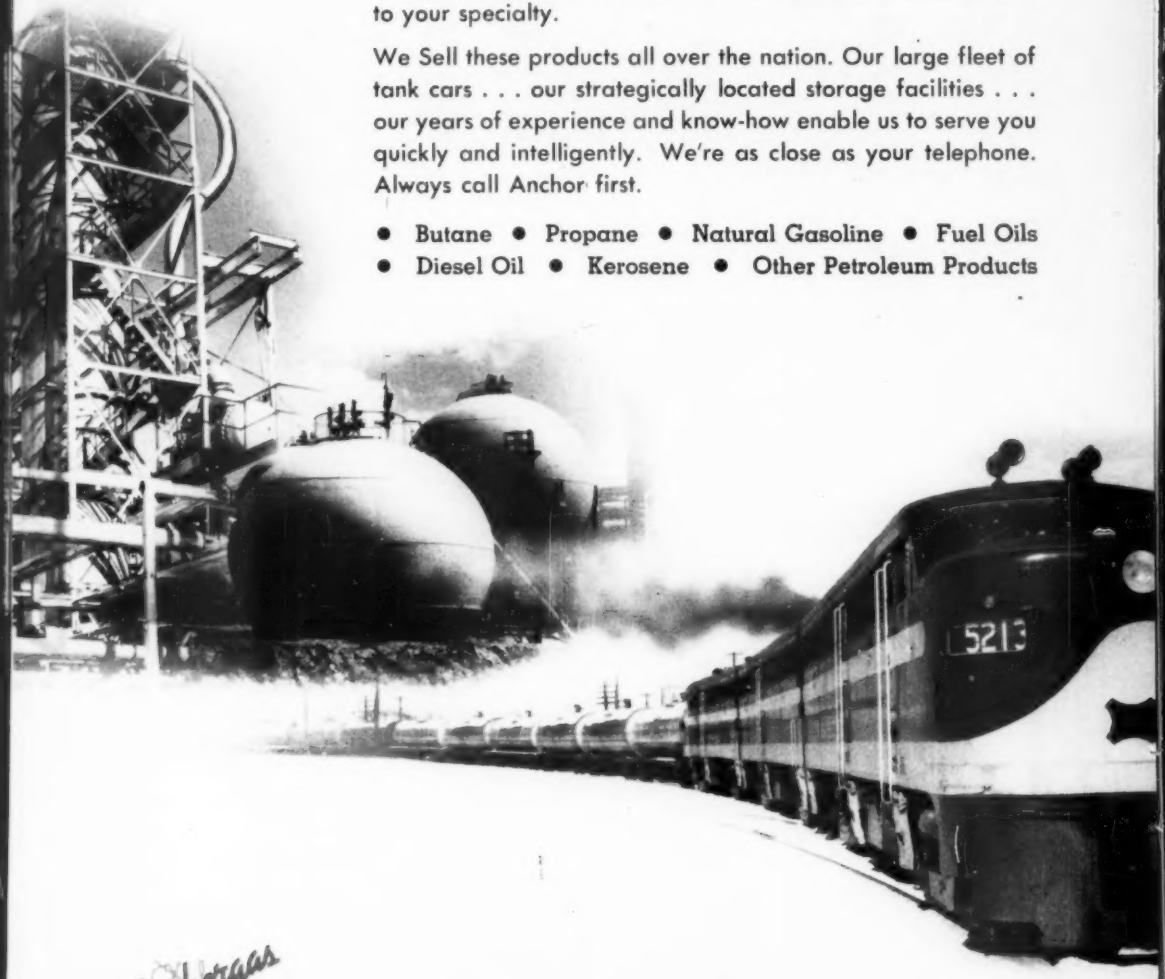

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May 10, 1951

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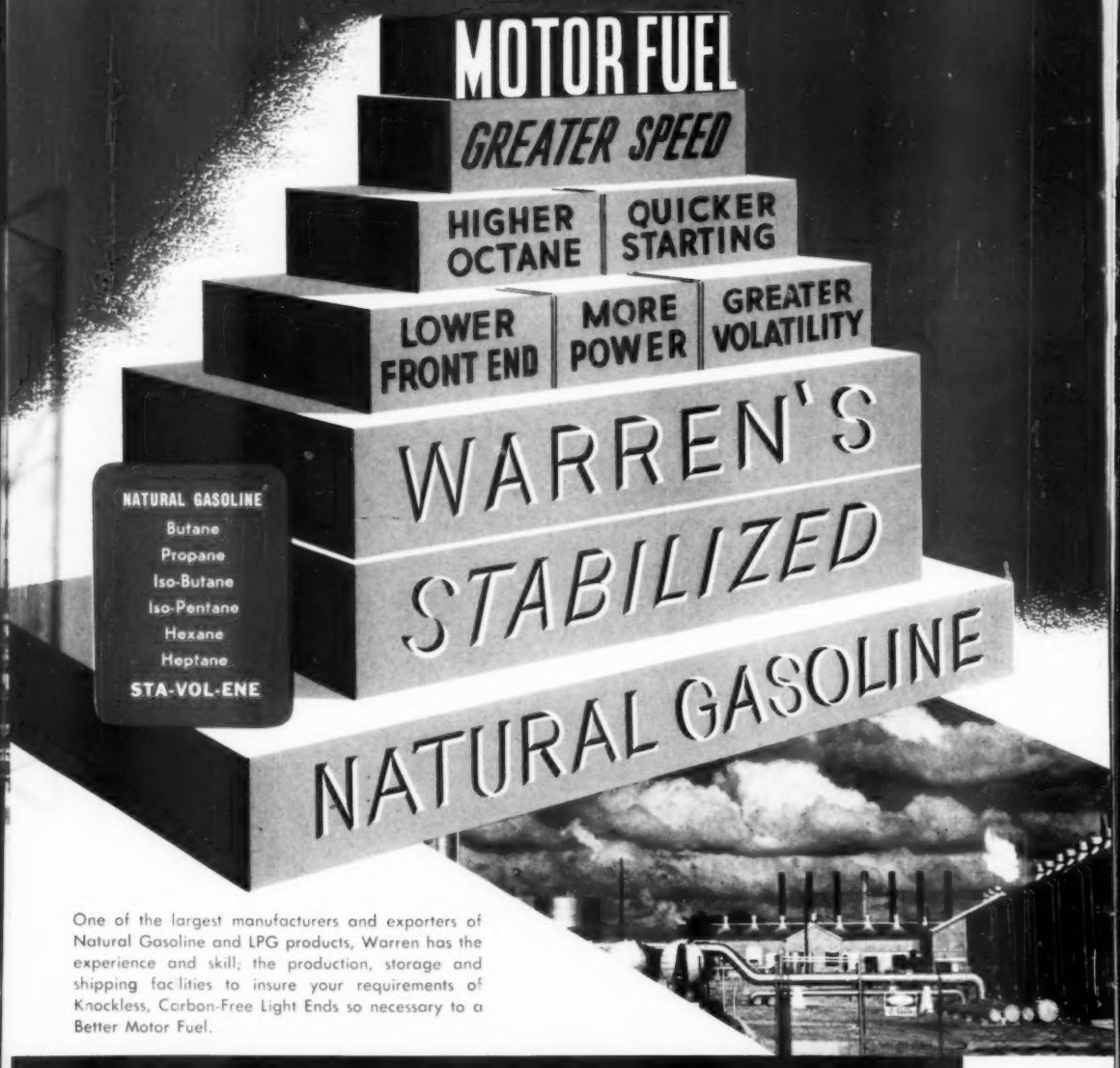

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Crude Oil, Natural Gasoline and Liquefied Petroleum Products

High Compression

Over a long period of years the work of automotive designers in developing higher compression ratios for motor-car engines has greatly improved car performance and kept petroleum refiners constantly striving for higher-octane gasoline and better-quality products.

During years to come there undoubtedly will be further benefits to both industries from new research and new advances in high compression and high octane. But there is an honest difference of opinion as to how far these advances should go and how fast they should be pressed at this time. In the present period of national emergency, when refiners are straining to meet potential military demands for aviation gasoline and other special products, it would be wise to make an objective study of where this compression and octane race may lead.

This subject was brought to the fore at the A.P.I. refinery meeting last week. A paper by an automotive engineer suggested that a new engine with a compression ratio of 12 to 1, operating on a fuel rating above 100 octane, would give many more miles per gallon, save motorists huge sums annually, and reduce the nation's gasoline consumption.

This pleasing prediction may eventuate in time, but many refiners question the wisdom of discussing it as something that is just around the corner. On the basis of present technology, the commercial production of large quantities of this fuel of the future would require the investment of hundreds of millions of dollars in new refinery equipment, and less of this fuel could be made from each barrel of crude. So the possible savings in cost per mile or in conservation of petroleum remain in the realm of speculation.

Many engineers connected with the refining industry doubt whether the American motorist at this time is as much interested in economy of fuel consumption as in luxury performance and convenience of his automobile. They feel that much of the additional power which has been put into motor fuel by the increase in octane ratings in recent years has been translated by automotive designers into speed, quick getaway, and other performance characteristics instead of into economical operation.

There is a growing view in refining circles that automotive designers could get more miles per gallon from today's gasoline by various improvements in engines commonly called building "mechanical octane numbers" into the motors. There are several promising avenues of such research.

Whatever the ultimate outcome, the petroleum industry must put first things first, and its immediate big job is to build up and adapt its refinery plant to be prepared to meet all potential military requirements. In a few years, let us hope, refiners will be in position to concentrate on the problems of providing large quantities of low-cost fuel designed to take full advantage of the potentialities of the high-compression engine.

THIS WEEK

GOVERNMENT—OPS issues crude-price-ceiling order, fixing January 25 as control date and setting May 12 as effective date of order. . . . "Tailored" regulation takes crude oil out of general price-ceiling regulations. . . . ¶House ways and means committee rejects Treasury Department attempts to slice depletion allowance, adopts tentative decision to make no reduction. . . . ¶NPA approves drilling of 2,400 wells outside United States and Canada this year, approves supplementing European mills' output with domestic oil-country tubular goods. . . .

DRILLING—Long Beach Oil Development Co. announces plans for 100-well program from recently enlarged Pier A in Long Beach Harbor. . . . Wells would tap undrilled portions of field beneath Terminal Island and areas southward toward line past which Government claims paramount rights. . . . ¶Driller should be given responsibility for safety on operating rigs, A.A.O.D.C. members agree at Dallas safety clinic. . . . Safety-program support from roustabout to president declared essential. . . .

PRODUCTION—West Coast operators expecting California production to reach million barrels daily by middle of year. . . . Controlling factor to be availability of tubular goods and field equipment. . . . ¶Production above MER will be necessary if imports are lost, military demand jumps, or foreign demands increase greatly, I.P.A.A. told. . . . ¶Olin Culberson says loss of Iranian oil would cut nation's reserve producing capacity to 139,000 bbl. daily, compared with more than 1,100,000 bbl. at start of Korean war. . . .

DEMAND—I.P.A.A. predicts 1951 demand will average 7,415,000 bbl. daily. . . . Figure is increase of 9 per cent over 1950. . . . ¶President's military budget indicates sharp increase in military requirements for liquid fuels and lubricants during next 12 months. . . .

TRENDS—Wildcat completions through May 3 were up 532 wells over same weeks last year. . . . Development completions decreased 326 wells for a net increase in total wells of 206. . . . Wildcats accounted for 21.8 per cent of all completions compared with 19.8 per cent for the year 1950 and 15.5 per cent for 1946. . . .

ACTIVITY—Crude production averaged 6,107,825 bbl. daily for week ended May 5, an increase of 23,675 bbl. daily over previous week. . . . ¶Total completions increased 6 wells for the week to 783. . . . Wildcat completions increased 30 wells to 200 compared with 134 for same week last year. . . . ¶Rotary rigs operating in United States on April 30 totaled 2,378 compared with 2,373 for previous week and 2,049 for same week in 1950.

PIPE LINES—Supreme Court in Champlin case rules that oil pipe lines used as plant facilities and carrying only owner's oil are not subject to federal regulations. . . . Rates not subject to I.C.C. review and company may not be required to operate as a common carrier, court says. . . . ¶El Paso Natural says it will file suit to determine obligations to become a common carrier in effort to complete San Juan pipe line across Arizona. . . . Project now held up by Interior Department through control over Navajo Reservation. . . . ¶Service Pipe Line Co. will build extensive crude-gathering system for fields along northeastern edge of Permian basin. . . .

REFINING—Atlantic Refining Co. announces plans for major expansion of Philadelphia refinery. . . . Program to include installation of 50,000-bbl. distillation unit, new cat cracker, and additional alkylation and polymerization facilities. . . . ¶PAD says it will issue no more quick-amortization permits for construction of basic refining facilities. . . . Minimum essential increase in capacity covered by certificates already issued. . . . Action will not affect special categories such as alkylation plants and facilities producing aromatics and butylenes. . . . ¶El Dorado, Ark., plant of Columbian Carbon Co. expected to be manufacturing carbon black from heavy, thermal-cracked petroleum fractions by September 1. . . . ¶Pan-Am Southern Corp. announces operation of 1,475-bbl. HF alkylation unit at El Dorado built during war. . . .

MORE CAPACITY.—A boost in the nation's needed catalytic cracking capacity is represented by this new air-lift Thermofor unit of Socony-Vacuum Oil Co., Inc., now nearing completion at the company's East River refinery in Brooklyn. The unit will have a daily throughput of 15,000 bbl. to be converted into high-quality gasoline and other petroleum products. Replacing an existing Houdry unit, the new cracker will increase cracking capacity in the refinery by 50 per cent.

Crude Price Ceiling

OPS establishes January 25 as control date on pricing of crude oil, makes tailored price order effective May 12

WASHINGTON.—Crude oil's ceiling prices shall be generally the prices posted January 25 for any given pool, the Office of Price Stabilization ruled in a regulation issued May 8.

The regulation becomes effective May 12.

Crude's new ceiling price will now be officially known as Ceiling Price Regulation 32, or "CPR 32." Its effect is to take crude oil out from under the general ceiling price regulation which governed all commodities, petroleum and other, until such time as OPS could establish special ceilings, industry by industry.

GCPR established the temporary universal ceiling at the highest price set by purchasers between December 19, last, and January 25. CPR 32 replaces this.

In giving crude its own ceiling OPS is attempting to give the industry as with all industries being given their own maximum prices, a pricing regulation "which will take account of the customary practices and methods of this segment of the petroleum industry." Thus, in this case, OPS explained, the purchaser or refiner traditionally establishes crude-oil prices, rather than the consumer.

Above ceiling contracts.—A special provision of CPR 32 covers contracts made before December 9, 1950, which were in effect January 25, 1951. The crude-oil producers may carry out these contracts even though they call for higher prices than those posted on January 25, provided deliveries were made before January 25 under the terms of such contracts.

Upon the termination of such a contract, it may be extended by the buyer and seller on the same terms, and payment of prices under these contracts shall not be deemed a violation of the ceiling.

Under GCPR, every crude purchaser is required to file within 30 days a report listing the purchase price he posted or paid for crude purchased from each pool. "This information will enable the director of price stabilization to spell out specific prices for all pools," explained OPS.

In its definitions, OPS said that "the ceiling price at the receiving tank for crude petroleum from any given pool shall be the posted purchase price as of January 25, 1951, for such pool."

Where there was, for any pool, more than one posted purchase price, the ceiling price at the receiving tank for crude petroleum from such pool shall be the highest of the posted purchase prices.

Special cases.—Where there was no posted purchase price for a pool but sales of crude petroleum were made by a producer from the pool, the ceiling price at the receiving tank shall be the highest price paid during the period December 9, 1950, to January 25, 1951, inclusive, at any receiving tank of that producer in the same pool for crude petroleum of the same quality.

If, however, this price was paid pursuant to a contract which did not reflect current market conditions on January 25, 1951, the ceiling price shall be determined by a special provision as follows:

Then "the seller or purchaser shall set a tentative price for crude petroleum at the particular receiving tank or tanks which shall be in line with the ceiling prices of comparable crude petroleum in the same general area." This tentative price with supporting data must within 15 days be submitted to OPS with a written request for its approval.

CPR 32 also provided that the ceiling price for any seller or purchaser of crude sold at a point other than the receiving tank shall be at no greater differential over the ceiling price at the tank "than the highest differential that existed on January 25, 1951, between the price at the receiving tank and the price at such point."

On the other hand, if there was a contract in force January 25 establishing a differential which did not reflect current market conditions, this differential shall be subject to revision by OPS so as to reflect current market conditions as of January 25.

Where a differential was not established for a point other than the receiving tank, the producer and seller shall establish such a differential based on quality and transportation costs for a sale of oil at such point, and within 15 days request OPS to approve the same, submitting supporting data.

The amount of any tax increase effective after January 25, 1951, incident to the production, severance, gathering, sale, transportation, delivery, processing or use of crude petroleum, except import duties, may be added to the ceiling price.

Depletion Allowance

House committee rejects Treasury Department pleas for reduction, even provides increase for coal industry

Bertram F. Linz

WASHINGTON. — Reduction of the depletion allowance for oil and gas production has been turned down by the House ways and means committee, now writing new tax legislation, for the present at least.

Rejecting all Treasury Department pleas for restrictions, the committee adopted tentative decisions to make no reduction and emphasized its sentiments on the subject by putting additional minerals on the depletion list and increasing the percentage for coal from 5 to 10 per cent.

By its action, the committee disclosed its refusal to accept compromise proposals submitted by the Treasury when it became evident its recommendation for an across-the-board cut in the allowance for oil and gas would be turned down.

Compromise plan.—The Treasury had asked for reduction of the allowance from 27½ to 15 per cent but with an extra allowance of up to 12½ per cent for wildcat discoveries in which substantial expenditures are made.

Under the proposed compromise the Government would derive an additional revenue of $200,000,000 to $225,000,000 a year as against the $300,000,000 estimated from the original proposal for a flat cut to 15 per cent.

The new plan was the subject of a report by the staffs of the Treasury and the Joint Committee on Internal Revenue Taxation in which it was made clear the Treasury is not receding from its demand that the allowance be set on a 15 per cent basis. But, the report said:

"To eliminate any possibility that the proposed change in depletion rates will unduly restrict exploratory activities, taxpayers could be permitted as large a deduction as under the present law, provided they make sufficiently large expenditures for exploration and discovery.

"This could be accomplished," it was explained, "by allowing an additional deduction based on the excess of exploration and discovery expenditures over the reduced depletion deduction, subject to the limitation that the combination of the deduction for

depletion and the new exploration discovery deduction could not exceed the depletion deduction allowed under existing law. While the definition of exploration and discovery costs for this purpose has not yet been fully developed, it would necessarily have to be limited to such costs as are incurred in connection with wildcatting and exploration in unproven areas rather than in the further development of proven fields.

"Under this modification oil and gas operators would be given a 15 per cent depletion rate in all cases and could qualify for additional deductions in the event that their total expenses for exploration and discovery exceeded the amount of the 15 per cent depletion deduction. The additional deduction would be permitted up to an amount equal to the difference between the deductions under a 15 per cent rate and a 27½ per cent rate."

In this way, it was pointed out, the present rates of depletion would be available to any operator who actually used the funds for exploration and discovery work.

Another incentive.—As another incentive to adoption of the proposal, the Treasury suggested that provision be made to insure operators the full benefit of the allowance.

"Because of the irregularity of exploration and discovery expenditures, as well as the year-to-year fluctuations in income, it would be desirable to provide a carry-forward of the excess of the exploration and discovery expenditures over the ceiling fixed upon the combined deductions," the report said in this connection.

"It is recognized that it may be necessary to limit the proposed special deduction for exploration and discovery costs so that a taxpayer will not be able to obtain a tax reduction in excess of the amounts actually expended for these purposes," the report added.

Stripper wells.—The Treasury expressed a willingness to leave the depletion allowance unchanged so far as stripper-well and secondary-recovery operators are concerned, explaining that this would meet representations made at the hearings of the need for special treatment for such activities.

"It is believed that a reduction in the depletion rate on oil and gas will have little or no effect upon the amount of allowable depletion in the case of most of the so-called stripper-well operators because their profit margins are comparatively small and, therefore, the amount of allowable depletion is in fact determined by the 50 per cent of net income limitation," the report said. "However, a number of witnesses urged the importance of a 27½ per cent depletion rate for the stripper-well operators and in view of the character of their operations the present 27½ per cent rate might be continued in their case. A stripper

WATCHING WASHINGTON

Bertram F. Linz

Reactivation

New production facilities which normally have limited economic value in peacetime, such as alkylation plants for aviation gasoline, will be financed directly by the government under a new policy worked out in the Munitions Board.

In the case of alkylate, it is estimated that it would cost anywhere up to $1,000,000 each to reactivate the now-idle wartime plants and of course much more, to build new ones. Experience has made refiners reluctant to sink large sums in this type facility.

Several suggestions were made to the board concerning methods which could be followed in securing needed facilities. PAD, for instance, recommended that, in addition to certificates for accelerated amortization, the armed services could contract to buy aviation fuel products over a 3 to 5-year period and possibly take other steps to assure refiners a return on their investments.

There was considerable opposition within the board to long-term commitments which, in the event of early termination of the present emergency, might leave the military tied to contracts under which they would have to take large volumes of unneeded products or terminate the contract by compensating contractors. It was believed that it might prove cheaper in the long run for the government to build the facilities itself.

The outcome was that Congress has been asked to provide $10,000,000 for rehabilitation and repair of existing plants to provide 4,000 bbl. daily additional alkylate output. Present usable-production capacity is 127,000 bbl. a day. This would be less than half that required for an all-out war, but the defense program calls only for an increase of around 31,000 bbl. daily by next year, and the rehabilitation program would be the first step.

Dead Duck?

Tidelands legislation may be dead for this session of Congress as a result of a 7-to-6 vote by the Senate interior affairs committee against substitution of a quitclaim bill for the O'Mahoney resolution providing interim federal management.

Chairman Joseph C. O'Mahoney of Wyoming is still hopeful of getting favorable action on his measure as modified to be more attractive to the states and the oil industry. However, he must beat off a number of amendments prepared by Sen. Russell Long of Louisiana designed to put management in the hands of the states.

O'Mahoney frankly admits he does not know whether his resolutions giving the Secretary of the Interior the authority to grant leases in the Gulf of Mexico would survive a Senate vote. Furthermore, a number of congressmen from the Southwest have expressed confidence that it could not get through the House, even if the Senate passed it.

With O'Mahoney's committee refusing to sanction it, the only way the quitclaim bill could be brought up in the Senate would be by offering it as a substituting amendment for the interim resolution, if and when it is brought up for consideration.

All new development in the Gulf tidelands was halted by the Supreme Court decision in the Texas-Louisiana cases and cannot be resumed until Congress decides who shall handle the leasing.

Infiltration

A Senate committee with a long name, popularly known as the Kefauver Committee, is much concerned over the efforts of racketeers to become "respectable," and at the same time find a means of hiding their illegal gains from the tax collector, by securing interests in legitimate businesses.

The committee found racketeer infiltration in 46 lines of enterprise, including oil, "in which there is a large turnover and in which problems of accounting and control are difficult."

Even in business, crooks can't go straight as evidenced by the committee's findings that where they get into enterprises dealing with the public the public is overcharged and gypped unmercifully.

The crime investigation developed evidence that a number of hoodlums have invested heavily in the oil business, "another example of how illegal gains may be invested as a cover or foil to avoid taxes," the committee said.

Typical, but not all-inclusive, is the interest a number of Capone syndicate associates have in an oil venture in Wyoming, and Frank Costello's investment in a Texas oil company.

The interests of gangsters in the oil industry are not just investments but part of an apparent program to acquire business interests.

property might be defined as one on which the average unrestricted production per well is less than a stated number of barrels of oil per day.

Secondary recovery.—"Closely related to the stripper-well problem is that of the producer using secondary recovery methods. It is more likely that the change in the depletion rate will have real meaning in these cases than in the case of stripper wells because the secondary recovery operation is characterized by a short period of flush production during which the depletion allowance may not be determined by the percentage of net income limitation, even though the latter may effectively determine the amount of allowable depletion during most of the life of the property. If the committee wishes, the 27½ per cent depletion rate might be continued in such cases without restriction."

Treasury allegations the option to expense intangible drilling and development costs amounted to a double deduction were supported by the report, which recommended that the depletion allowance be computed by applying the percentage to the gross income reduced by the amount of the intangible drilling and development costs claimed as a deduction with respect to the specific property.

In its initial marking up of the tax bill, the committee also adopted a tentative decision to make no revision in the tax treatment of cooperatives.

CMP Rules

First regulations issued; forms being distributed

WASHINGTON.—The first regulations covering the Controlled Materials Plan which goes into effect July 1 have been issued by the National Production Authority.

Forms on which producers are to make application by May 31 for allotments of steel, copper, and aluminum are now being distributed.

Manufacturers of all types of oilfield machinery and tools, and of subsurface oil-well pumps, except boiler-feed, are to file their applications with the Petroleum Administration, but manufacturers of petroleum refining machinery and equipment will submit their applications to the general industrial equipment division of NPA.

Oil-field machinery repair services will come under the service equipment division of NPA, but will not be granted controlled materials allotments at this time and are instructed not to apply, except for materials for all parts to be used for repair purposes.

Under CMP, products using steel, copper, or aluminum are divided into two categories: Class A products, which include special-purpose items built to order for the military agencies, for which allotments of materials will be made by a claimant agency to its prime contractors, and Class B products, which include common industrial components, essential equipment, machine tools, etc.

The oil-industry equipment listed above is included among more than 4,000 items listed by NPA in its Class B list, part of an index of between 12,000 and 13,000 products which eventually will be set up.

Class B allotments will be made almost entirely by NPA industry divisions, of which PAD is considered one for purposes of CMP, on the basis of a division of the anticipated supply of materials figured against requirements submitted by manufacturers on Form CMP-4B.

Champlin Decision

Supreme Court rules line not subject to regulation

WASHINGTON. — Oil pipe lines operated as plant facilities and carrying only oil owned by them are not subject to federal regulation even though they cross state lines, the Supreme Court ruled May 7 in a split decision involving Champlin Pipe Line Co.

A majority of the court held that the company must file reports with the Interstate Commerce Commission and maintain a uniform system of accounts, but its rates are not subject to I.C.C. review and it cannot be forced to operate as a common carrier.

There were several dissenting opinions, some justices holding that the line is subject to complete jurisdiction as a common carrier and others that it need not even file reports.

The line in question runs from the Champlin refinery in Enid, Okla., northeast to company terminals in several states and has no physical connection with any other pipe line or refinery. The question of jurisdiction over the line has been in litigation for several years.

Fuel Requirements to Increase

WASHINGTON.—Requirements of the armed services for liquid fuels and lubricants will increase sharply in the next 12 months, it is indicated by the military budget submitted to Congress by President Truman for the fiscal year beginning July 1.

The greatest increase will be in requirements of the Air Force, which is now beginning to build up substantially. Exactly how big the increase will be was not known, since the $911,000,000 asked for aircraft, materials, and supplies was not broken down to show estimations for fuel and lubricants.

The Navy submitted an estimate of $196,000,000 for fuel, lubricants, and drums, an increase of $29,000,000 over the appropriation for the current year and $89,000,000 over that for the fiscal year 1950.

The Army is to get $106,000,000 for fuel and lubricants, compared with $102,000,000 for the current year and $39,000,000 for 1950.

Amortization

PAD cuts off certificates for "basic" refining units

WASHINGTON. — Projects already outlined by the oil industry are adequate to bring basic refining capacity to a level meeting PAD program objectives and the Petroleum Administration, accordingly, has discontinued recommending certificates of accelerated tax amorization for such facilities.

PAD's action was in line with a policy adopted by the Defense Production Administration to cut back on plant expansion, partly because it has reached target proportions in many lines but more importantly because of the tightening steel-supply situation.

The termination of certificate approvals was announced over the name of Secretary Chapman, who explained that it will apply to basic refining facilities only and not to those of special military products, such as aviation gasoline and alkylate, or special petroleum products needed in the defense program such as aromatics and butylenes. Also, he said, it will not apply to basic expansion of other segments of the oil and gas industry, such as pipe lines or storage facilities.

Applications for accelerated amortization so far received in PAD for recommendation will provide an increase of over 1,000,000 bbl. daily in domestic basic refining capacity. So far, facilities with an aggregate capacity of 370,000 bbl. a day have been approved by the Defense Production Administration.

PAD estimates of the needs of the defense program call for an expansion in basic refining capacity of 700,000 bbl. a day by the end of next year and another 300,000 bbl. a day by the end of 1953. This, Chapman said, will be sufficient to avert shortages of products as demands rise during the mobilization period but are far short of what would be required to meet the demands of an all-out war.

However, it was made clear, the limited supply of construction materials expected to be available has necessitated a decision to recommend no accelerated amortization certificates for basic refining capacity in excess of the minimum amount estimated to be needed to meet mobilization demands.

Commenting on the secretary's statement, Deputy Petroleum Administrator Bruce K. Brown empha-

sized that tax aid will continue to be given to expansion of facilities for special products badly needed, and stressed that the new policy has no bearing on such material priorities policies for construction projects as may be promulgated by Defense Production Administration, National Production Authority or PAD.

War Warning

Martinek tells industry to prepare now for sabotage

WASHINGTON.—A sharp warning to industry that its apathy to the threat of sabotage and espionage must be quickly overcome if the United States is to be adequately prepared to wage a major war was voiced last week by Frank V. Martinek, assistant vice president of Standard Oil Co. (Ind.).

Speaking before a panel at the annual meeting of the U. S. Chamber of Commerce, Martinek declared we are as vulnerable to attack by "two-legged bombs"—trained saboteurs—as to atom bombs or any other kind, and indifference to this menace could be fatal.

Martinek laid down a 5-step program for setting up an effective industrial defense system, including:

1. Immediately alerting the top management of every industrial plant and facility to the fact that every industrial unit is in danger.

2. Immediate organization of defense procedures.

3. Inclusion in the organization of every plant a top executive committee on sabotage, espionage, and subversive activities to draw up a specific plan covering techniques for defense, to become effective immediately when needed.

4. Organization in each plant of a plant-control center, with a plant protection officer in charge, to serve as a clearing house for gathering, classifying, collating, and evaluating information from all sources within and outside the company or factory, maintaining centralized files of all information concerning defense plans, plant protection, and security, sabotage, espionage and subversive activities, and maintaining liaison and cooperative contact with the Army, Air Force, Naval and A. E. C. intelligence units; the FBI; municipal, state and national defense agencies, and other enforcement units in the state.

5. Organization and training of volunteer groups in rescue, first aid, radiological monitoring and other activities.

Foreign-Drilling Program

WASHINGTON.—A program for the drilling this year of approximately 2,400 wells in foreign countries other than Canada has been approved by the National Production Authority, and casing and tubing procured from European mills will be supplemented by domestic oil-country tubular goods in amounts sufficient to carry the program out.

Authorizations to place orders for specified amounts of casing, tubing and drill pipe for shipment from United States mills during July have been issued to 41 petroleum operators for use abroad, on the basis of drilling programs approved by the Petroleum Administration. Under these programs average daily crude production abroad for 1951 is estimated at about 4,500,000 bbl. daily.

The individual operators are being notified that they may use a priority rating of DO-48F in placing orders under their authorizations.

PAD Gets Storage Authority

WASHINGTON.—Authority over facilities for bulk storage of petroleum and gas has been delegated by the Defense Transport Administration to the Petroleum Administration for Defense. Reason for the transfer was given as being that PAD can more advantageously handle tank facilities because storage is so closely integrated with refining and marketing of oil.

Steel-Drum Restrictions

WASHINGTON. — Restrictions on the less essential uses of steel drums will be imposed by the National Production Authority in the near future.

The problem of assuring larger supplies of steel drums for defense and essential needs has been under discussion with manufacturers and reconditioners, the latter being concerned primarily over the increasing shortage of phenolic resins used in reconditioning processes. Chemicals are required both for drum linings and for exterior finishes.

MEETINGS

A.I.Ch.E. Program

KANSAS CITY.—A program of particular interest to the oil industry will be presented at the regional meeting of the American Institute of Chemical Engineers at the Hotel President here May 13-16.

Technical papers to be presented include:

May 14.—"Heat Transfer to Fixed Fluidized Beds," Richard W. Bartholomew, graduate student, and Donald L. Katz, professor of chemical engineering, University of Michigan; "Heat Transfer and Pressure Drop in Fixed and Fluidized Beds," Jacob Eichorn, graduate student, and Robert R. White, professor of chemical engineering, University of Michigan; "The Application of Radioactive Tracers to Diffusional Operations," H. E. Hughes, C. F. Braun Co., Alhambra, Calif., and J. O. Maloney, University of Kansas, Lawrence, Kans.; "Product Distribution in Catalyzed and Uncatalyzed Batch Hydration of Ethylene Oxide," P. S. Davis, C. E. Van Waaden, and F. Kurata, University of Kansas, Lawrence, Kans.

May 15.—"Modern Trends in Gas Plants for Catalytic Cracking Units," Forrest E. Gilmore and Robert D. Bauer, Phillips Petroleum Co., Bartlesville, Okla.; "Modern Advancements in Hypersorption Design," Clyde Berg, Union Oil Co. of California, Wilmington, Calif.; "Sulfur From Hydrogen Sulfide," Bernard William Gamson and Robert H. Elkins, Great Lakes Carbon Corp., Chicago; "Corrosion in CO_2-H_2S-Amine Systems," K. L. Hujsak, G. R. Davis, and E. C. Carlson, Stanolind Oil & Gas Co., Tulsa; "The Use of Brazing Aluminum in Heat Transfer Equipment," H. O. Rooks, Trane Co., La Crosse, Wis.

May 16.—"Metal Poisoning of Fluid Cracking Catalyst," B. J. Duffy and H. M. Hart, research department, Standard Oil Co. (Ind.), Sugar Creek, Mo.; "Regeneration Characteristics of Cracking Catalysts," G. M. Webb and M. J. Den Herder, research department, Standard Oil Co. (Ind.), Whiting, Ind.; "Vis-breaking of a High Vacuum Petroleum Residuum," J. G. Allen, D. M. Little, and P. M. Waddill, Phillips Petroleum Co., Bartlesville, Okla.; "High Pressure Hydrogenation of Crude Shale Oil," M. G. Pelipetz, M. L. Wolfson, and E. L. Clark, Bureau of Mines, Pittsburgh; "Propane Deasphalting for Reduction of Refinery Residues," John G. Ditman, Foster Wheeler Corp., New York City.

"Preparation of Crude Synthesis Gas From Hydrocarbons," H. A. Tuttle, Chemical Construction Corp., New York City; "Purification of Ammonia Synthesis Gas," W. W. Yeandle and G. F. Klein, Spencer Chemical Co., Pittsburg, Kans.; "Synthesis of Ammonia at 350 Atmospheres," L. B. Hein, Tennessee Valley Authority, Wilson Dam, Ala.; "Ammonia Synthesis at 1,000 Atmospheres—The Present Day Claude Process," H. L. Thompson, Mississippi Chemical Corp., Yazoo City, Miss.; Pierre Guillaumeron, L'Air Liquide Societe, Paris, France; and N. C. Updegraff, Girdler Corp., Louisville.

P.C.G.A. Conference

BAKERSFIELD, Calif.—Reports from the gas measurement and transmission procedure committee will launch the annual transmission conference of the Pacific Coast Gas Association's technical section to be held May 16-17. The committee reports will be given by F. N. Partridge and W. H. Krammes, respectively. Both are with Southern California Gas Co.

Papers to be presented at the conference include:

"Gas Transmission Accidents and Preventive Measures Therefor," Ralph Lesley, Pacific Gas & Electric Co.; "Some Interesting Notes on Repair and Testing Along With a Discussion of Weld and Plate Defects and Their Interpretation in Large Diameter High-Strength Pipe," W. A. Saylor, Consolidated Western Steel Corp.

"Gas Engine Operation and Maintenance," F. E. Glendening, Pacific Gas & Electric Co.; "Engineering and Economic Aspects of Gas Turbine-Centrifugal Compressor Installation in Intermediate Booster Stations," C. L. Moore, El Paso Natural Gas Co.; "Gas Turbine Applications in the Gas Industry," J. L. Oberseider, Southern California Gas Co.; "Personnel Training," M. H. Allan, British Columbia Electric Co., Ltd.

"An Electric-Driven Automatic Compressor Station," R. S. Nabors, Pacific Gas & Electric Co.; "Remote Control Installations," W. L. Masheter, Southern Counties Gas Co., and A. C. Alter, Southern California Gas Co.; and "Nitrogen Purge of New Mains," H. C. Judd, Coast Counties Gas & Electric Co.

NEW DRILLING SITES.—The new portion of Pier A, in the foreground, in addition to providing space for expanded harbor facilities will provide the drill sites for a hundred or more new Wilmington producers. The derricks on the far edge of the pier are the drill sites for wells to be bottomed in the bay area toward Rainbow Pier.

Harbor Program

Enlarged Pier A provides sites for 100 new wells

LONG BEACH.—Long Beach Oil Development Co. soon will start a 100-well drilling program from the recently enlarged Pier A in Long Beach Harbor.

The project is another step in the harbor-development program, which has been described as one of providing sites from which additional wells can be drilled to gain additional income so that more fills can be made to provide sites for more wells.

One effect of the entire program is the continuing expansion of port facilities.

Also, by about July 1, a dike-building and earth-filling program will be started to protect some producing wells whch are being submerged by high tides. This work is necessitated by the fact that the Terminal Island area is continuing to subside at the rate of 1 ft. per year.

Expected to cost about $14,000,000, it will involve raising some areas as much as 12 ft. In these low places, surface equipment will have to be raised and the casing and tubing extended accordingly.

In addition, gathering lines, some of which are already buried more than 10 ft. because of past land-building operations, will have to be relaid to some wells.

The L.B.O.D. drilling program will take place on the southern end of its W, Y, Z, Z-1, and J leases at Terminal Island. Drilling will be conducted from the widened Pier A, developing undrilled portions of the field beneath the island and southward toward the stipulated line beyond which the federal Government claims paramount rights. Thus, much of the development will involve slant-hole drilling.

On the southeastern tip of the pier, Richfield Oil Corp. already has underway a new 35-well program, slanting wells from the pier into its Parcel-A lease between Pier A and Rainbow Pier on the beach. The L.B.O.D. development will begin as soon as storage facilities are completed, fire walls for which are being erected.

Rising Production

Crude output of 1,000,000 bbl. daily seen in California

D. H. Stormont

LOS ANGELES.—California crude-oil production, which averaged about 964,000 bbl. during April and has hovered near that level for the past 3 months, is slated to rise even higher in coming months.

If all goes well, the state's crude production might reach 1,000,000 bbl. daily by midyear.

The most important factor affecting this forecast will be the availability of tubular goods and other equipment needed for proposed development programs.

The supply of tubular goods varies from company to company. Some operators are hard pressed for steel. Others apparently are well fixed for this quarter—a few so well that they reportedly received a zero allotment from the Petroleum Administration for Defense for their third-quarter drilling.

So far this year wells have been completed at rates almost offsetting the normal 10 per cent annual decline of old wells. The year's record has been an average of about 120 oil wells per month, with the new wells having an average initial production of about 200 bbl. daily.

During May and June drilling programs scheduled call for a higher completion rate. If carried out, drilling activity thus should more than offset the normal decline and serve to increase the state's daily crude output.

Field programs.—Bulk of the anticipated production increase, however is scheduled to come from higher producing rates in a few fields.

At San Ardo field, currently without a pipe-line outlet, General Petroleum Corp. should have its new 8-in. line completed by midyear. Opening of the many shut-in wells there will add some 8,000 or 10,000 bbl. to the state's daily output.

At Wilmington field a proposed reduction of the casing pressure to atmospheric at a large group of wells in the harbor area is expected to result in an increased output of some 5,000 bbl. daily.

At the Coalinga Nose unit in San Joaquin Valley, an increase of at least 3,000 bbl. daily is planned. A considerably larger increase in production is being considered for some Ventura Avenue wells.

Long-term views.—Whether the 1,000,000-bbl. daily figure is reached by July or August is a question primarily of academic interest; it is a figure never yet reached in California.

More important is the fact most company officials believe that California can, with continued development of proved locations, maintain its current record high level of production for at least the next 4 or 5 years. And, if a national emergency requires such action, its production can be increased by some 100,000 bbl. daily at any time through opening of the Elk Hills Naval reserve.

Autos and Economy

Refiners at odds with car makers over benefits of new high-compression engines which require 100-octane fuel

George Weber

HIGHER compression ratios for future automotive engines and their effect on the motorist's fuel bill, occupied the attention of refiners at a special session of the meeting of the American Petroleum Institute Division of Refining here last week.

The possible economies accruing to the motoring public by widespread adoption of higher-compression-ratio cars were subjected to scrutiny from three standpoints: mileage to be obtained on the bases of gallons of higher-octane gasoline, dollars, and barrels of crude.

The discussion, based on performance of an experimental engine with a compression ratio of 12 to 1 and requiring a fuel of about 103 octane numbers, revealed a wide area of differing opinion on what the possible benefits might be with regard to fuel costs and crude conservation.

G.M.'s ideas.—In discussing the "Economic Relationship of Engine-Fuel Research," C. L. McCuen, general manager of the Research Laboratories Division, General Motors Corp., reviewed past trends in compression ratio and projected his company's views on the possibilities of the future.

Reviewing the period 1930 to 1950, he presented data on 29 models of cars from 15 manufacturers, charting increases in average curb weights, rated horsepower, speed, acceleration, compression ratio and miles per gallon. An unweighted, arithmetic average of the 29 models studied showed an increase in fuel economy from nearly 15 miles per gallon in 1930 to over 19 miles per gallon in 1950, based on level-road, constant-speed tests at 40 m.p.h. Over the same period research octane number increased from 60 to 84 for regular-grade gasoline and from 74 to 90 for premium.

McCuen then described the new experimental V-8, 12:1 compression-ratio engine whose performance in a "19XX" Cadillac equipped with a new improved automatic transmission was compared directly with the performance of the stock 1951 Cadillac. With comparable acceleration performance, McCuen stated that the 12:1 Cadillac showed a fuel economy of 30 per cent over the 7.5:1 compression-ratio 1951 model.

The octane requirement of the new 12:1 compression-ratio car used in these tests was equal to 100 octane plus 0.4 ml. TEL. This was estimated to be equivalent to about 103 octane number. The 1951 Cadillac used in the same tests had an octane requirement of only 85 when the combustion chamber was clean, although, McCuen stated, experience indicates that fuels of 90 to 92 research octane number may be required after the accumulation of combustion-chamber deposits in service.

On the basis of these tests, McCuen proceeded to highlight the potential fuel savings which he estimated would result from mass production and acceptance of the 12:1 compression ratio. We can save the automobile drivers of the United States 2½ billion dollars a year in their fuel bill, he said, amounting to a total of 10½ billion gallons of gasoline.

Refiners' answer.—To these dramatic estimates, refiners took some exception. In a prepared discussion on the McCuen paper, C. S. Teitsworth, chairman of the manufacturing committee of Socony-Vacuum Oil Co., Inc., reported that his company had conducted experiments with a car equipped with the General Motors research engine, obtaining data of the type presented in the paper for the 1951 and 19XX Cadillac.

At comparable compression ratios and with rear-axle ratios adjusted to give identical road acceleration and other performance characteristics, their data indicate a saving on the order of 11 per cent, considerably lower than the 30 per cent reported in the paper.

The limited time available to prepare his discussion did not permit him to evaluate the reasons for the discrepancy, he added. Socony-Vacuum found it necessary to use a higher rear-axle ratio in the 12:1 compression-ratio 19XX car than did General Motors to obtain comparable performance with the 7.5:1 1951 compression-ratio model, but that factor alone does not account for the differences obtained in the two experiments and additional study will be required to explain the discrepancy, said Teitsworth.

Economy questioned.—With regard to the statements on potential savings to the motoring public by adoption of the 12:1 compression-ratio car, Teitsworth said: "If the petroleum industry were able and did increase the quality of gasoline from the present octane-number levels to the 100-octane-number range, and all cars were converted to the 12:1 compression ratio, we fear that, while the motorist's fuel consumption may be reduced from 10 to 20 per cent it would not necessarily mean a reduction in the customer's fuel bill because of the added cost and energy losses incurred by manufacturing to the higher quality level.

"While the calculations are not given in McCuen's paper, we wonder if this increased cost has been recognized in arriving at the general statement that claims $2,500,000,000 a year could be saved as a result of going to the 12:1 compression-ratio automobiles of the type described.

"We should all realize," Teitsworth continued, "that, from an over-all conservation standpoint, the loss of efficiency in converting crude to the higher-quality product must be subtracted from the gains in efficiency of the automobile engine. The several billion dollars of capital investment required also would pose a serious problem. We should recognize, of course, that if 100-octane-number gasoline were generally available many of the older cars on the road would be using it unnecessarily."

Regarding the possibility of projecting into the future the past record of gasoline-quality improvement without sacrificing yield, Teitsworth expressed some qualified doubts.

"McCuen has quite properly indicated that in the past the petroleum industry has been able to improve quality while simultaneously increasing gasoline yields and recoveries. We like to think that this achievement is brought about by the intense competition in the industry which has forced it to maintain an outstanding research effort over the years. The quality improvements in the past were economical because they occurred at a rate consistent with the developments in petroleum research.

"However, based on presently known petroleum technology, the improvement in the quality of motor fuels up the 100-octane-number range could only be realized at a sizable capital expenditure and, even more important, at a high loss of energy in the conversion steps.

"We believe this indicates that we should not attempt to set too rapid a pace on quality improvement; for example, the present research and development in the field of catalytic reforming is indicating that losses in yield in this particular refining step can be held to 10 per cent or less as compared to the 25 to 30 per cent losses in yield experienced by thermal reforming.

"We are confident that research and development in this and other types of processing will enable the petroleum industry to continue to improve quality and minimize losses. We should caution, however, that the timing of significant developments in

this field cannot be predicted and that a great responsibility rests with the automotive and petroleum industries to avoid too rapid a pace in quality improvement in order to avoid a net loss to our customer as well as a waste of natural resource."

Dollars and barrels.—H. G. Vesper of California Research Corp. joined Teitsworth in suggesting that in evaluating the potential economies of higher-compression-ratio cars, not only miles per gallon of gasoline be considered, but also, miles per dollar and miles per barrel of crude.

"If we now look at the availability of fuels for the modern, more efficient engines, we find that there are additional penalties that must be taken into consideration. Certain cracking and other processes permit the production of more and better gasoline from a barrel of crude; but as the octane number of that gasoline goes up, both loss of production and higher cost of plant facilities are encountered at an increasing rate.

"It has been pointed out by several authors recently that in the octane range now under consideration, the plant investment required to obtain even moderately higher octane levels will cost each major refiner from 5 to 20 million dollars per octane-number increase. At least a large share of such costs must be passed on to the customer.

"Of perhaps even more importance to the country is the effect the general need for very high octane-number fuels would have on the 'miles per gallon of crude' that might be obtained. Calculations have shown that, should the demand develop for large volumes of gasoline in the middle or higher 90's in octane rating, the losses due to processing in the refineries would be greater than the savings possible through increasing the compression ratios of automobiles. Care should be taken, therefore, to see that in our urge to obtain maximum miles per gallon of gasoline we strike a proper balance between resources of metal, men, and oil."

Built-in economy.—Refiners generally expressed the feeling that improvements might be made in automobile design which would transmit more of the increased engine efficiency to the rear wheels.

The greater economy shown by the 19XX Cadillac over the 1951 model is understood to be due in part to the installation of an improved automatic transmission, for example. While accepting the fact that the automatic transmission is one of the competitive factors in the automotive industry, desired by the motoring public from a convenience standpoint, refiners wonder if the efficiency of present units could not be improved.

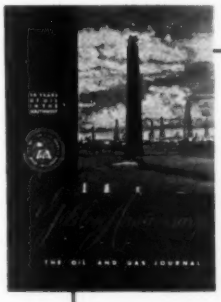
"As we view the application of the pure torque-converter type," said Teitsworth, "it appears from the information available to us that the loss in efficiency resulting from the application of this device to a given car cancels out the gains in engine efficiency that have been accomplished over the last 10-year period. The only conclusion we can reach, therefore, is that convenience has been allowed to displace economy.

"As a future objective, therefore, we would urge that the automotive industry, in addition to focusing attention on the convenience factor in automatic transmissions, give serious emphasis to their economy. We are confident that emphasis on the economy factor will enable the achievement of both convenience and economy in the use of the automatic transmission."

What ultimate octane need? — Some question remained in refiners' minds as to the actual, eventual octane-number requirement of the experimental 12:1 compression-ratio engine.

Assuming that the estimated 103-octane-number requirement was that for a new, clean engine, the question was raised as to what the engine's requirement might be after the accumulation of combustion chamber deposits in later service.

The spread in new and later octane requirements of the 1951 Cadillac was reported as varying from 5 to 7 octane numbers. Refiners wondered whether the 12:1 compression ratio engine would require an octane-number fuel of 108 in later service.



Announcing

Golden

Anniversary Number

The May 31 issue of The Oil and Gas Journal will feature a 488-page separately bound supplement devoted to "50 years of oil in the Southwest."

The number commemorates 50 years since Spindletop and the start of the Journal's fiftieth year.

Briefly, the publication is a history of men and events describing petroleum's growth in the colorful Southwest during a half-century of amazing progress. It will be the industry's most valuable reference source on southwest oil and gas.

The publication was conceived and outlined more than a year ago. Journal editors for many months were engaged in historical research covering all divisions of operations. Hundreds of individuals and companies in all parts of the Southwest, some of whose beginnings go back to Spindletop, cooperated in this work.

Out of family albums and dusty files came old-time pictures and musty documents. Little known historical records were consulted.

Then came the writing task of presenting facts concisely in a coordinated and interesting whole. Now the pages of what represents one of the greatest editorial accomplishments in Journal history are rolling off the presses.

You will want your copy of the Southwest's most comprehensive and readable oil history.

GULF COAST

Deep Basin

Mississippi wildcat, now attempting to recover core barrel, has cut nearly 3 miles of marine Cretaceous formations

WIGGINS, Miss.—Nearly 3 miles of marine Cretaceous rocks have been penetrated by the deep southern Mississippi wildcat 3 miles northeast of this city being drilled by George Vasen, Chicago.

Last week his 1 Tung Oil Corp., 9-2s-11w, was attempting to recover core barrel at total depth of 20,441 ft.; it was previously reported that he will set a string of production casing to test a gas sand logged in the upper part of the Smackover limestone of Upper Jurassic age.

The world's depth record holder is Superior Oil Co. 1 Unit, 27-27n-103w, Sublette County, Wyoming, which was drilled to 20,521 ft. in 1949.

Coring has been carried on continuously at the Vasen well from 14,450 ft. to the present depth. From correlations made from a number of deep tests drilled in eastern Mississippi, and western Alabama, it is known that the Lower Cretaceous rocks thicken rapidly gulfward.

Several objectives.—One of the objectives seen in deep drilling in the Lower Cretaceous and Upper Jurassic rocks in this basin is the Glen Rose lime. This formation was proven productive at a 1948 discovery to the north in Jones County where Gulf Refining Co. obtained commercial oil production at the 1 L. L. Majors, 29-6n-11w, from a perforated interval from 12,011-13,083 ft.

Glen Rose lime is also productive from another Lower Cretaceous basin in southern Florida, where at Sunniland, Humble Oil & Refining Co. has produced 24°-gravity oil since 1943 from depths below 11,500 ft. The South Florida basin is related to the Antillean region while the South Mississippi basin is closely related to the Appalachian tectonics.

Other potential deep horizons include the downdip equivalents of the Hosston gravels. In Central Mississippi, the Hosston gravel sections of Lower Cretaceous age attain a thickness of 1,360 ft. in Continental Oil Co. 1 John R. Cameron, 36-10n-1e; the Hosston rocks thicken southward toward the coast.

Eutaw sand possibilities of this region are suggested by updip production discovered in Jones County, Mississippi, in December 1950 by Ginther, Warren & Ginther, Houston. Their 1 L. L. Majors, 20-6n-11w, produced 80 bbl. of oil initially from 7,348-80 ft. in the Christmas (Eutaw) sand.

Potential deep horizons are the Cotton Valley and the Smackover limestone rocks of Upper Jurassic age, which produce in South Arkansas and North Louisiana but which do not yet produce in Mississippi.

Formation tops.—The released formation tops of the Vasen well are shown below and compared with the same formations logged in a 8,522-ft. dry hole drilled during 1941 at a wildcat about 1½ miles to the south.

Formation—	George Vasen 1 Tung Oil Corp., elev. 241 ft.	Danciger Oil 1 School Board,† elev. 212 ft.
Wilcox	2,616	2,640
Midway	4,910	(*)
Clayton	5,736	(*)
Selma	5,780	5,715
Eutaw	6,960	6,923
Marine Tuscaloosa	7,576	8,005
Massive	8,316	(*)
Lower Cretaceous	8,504	
Paluxy	10,475	
Glen Rose	12,595	
Total depth (5-9-51)	20,441	8,522

*Data not available. †C SE SW 16-2s-11w.

Salt dome basin.—A series of shallow piercement-type salt domes borders the updip portion of this basin. More than 20 salt domes are known from drilling from as far west as Warren County, Mississippi, to as far east as Wilcox County, Alabama. Two of these interior salt domes produce gas in southern Mississippi.

Superior test.—The Vasen well exceeds by more than 4,700 ft., the 15,720-ft. deep failure drilled 27 miles to the northwest of Forrest County, Mississippi, by Superior Oil Co. Superior 1 Cassie Bradford, 1-3n-13w, completed on May 30, 1947, penetrated the Lower Cretaceous rocks to a depth greater than any well drilled in Mississippi prior to that date.

Pistol Ridge.—The Vasen well lies 15 miles southeast from the nearest commercial production—Pistol Ridge field in Forrest County. The field was opened by I. P. LaRue during January 1951. His 1 Creosote Oil Corp. 7-1s-13w, drew an open-flow potential of 8,200 M.c.f. per day with tubing pressure of 2,480 psig. Initial production was 1,686 M.c.f. of gas plus 27 bbl. of condensate per day through 12/64-in. choke from casing perforations at 7,722-26 ft. in the Tuscaloosa formation.

Texas Depth Record

HOUSTON.—Meredith, Clegg & Hunt have broken their own record for deep production in the Texas Gulf Coast by completing a well at 12,631-12,725 ft.

The operators' 1 Weisse, in West Hamshire field, Jefferson County, flowed 20,000,000 cu. ft. of gas per day plus 59 bbl. of condensate per million cubic feet of gas through 380 jet perforations. The hole was drilled to total depth of 13,353 ft.

Prior to completion of this well, the Texas Gulf Coast record holder was the 1 Earl C. Hankamer, drilled last year as the discovery well for West Hamshire field. Completion was made from open hole at 12,607-70 ft. On open-flow gage, the discovery well made 125,000,000 cu. ft. of gas daily, plus 53.4 bbl. of 51.6° gravity distillate per million cubic feet of gas.

Oil Building O.K. Reported

NEW ORLEANS.—The National Production Authority has tentatively approved construction of a 16-story, $3,000,000 building to be occupied principally by The Texas Co., according to Mayor deLesseps S. Morrison.

A spokesman in the mayor's office said Morrison had been informed by an official of the Commerce Department that approval of the structure would be forthcoming shortly.

However, neither Texas nor Grace Church, planners of the building, has received notification of approval of the project. The district manager for the Department of Commerce which administers NPA program in this area likewise said no NPA authority has been granted.

SOUTHWEST

Kerr-McGee High Bidder

AUSTIN.—Bids totaling $3,208,124 were received here for leases on 274 tracts of state-school land.

High bid was $210,000 submitted by Kerr-McGee Oil Industries, Inc., on a 427-acre tract near Nueces Bay, according to Land Commissioner Bascom Giles.

Nitrogen Removal

Improved thermal deliverability of long-distance gas lines possible through new processing, A.G.A. is told

DALLAS, Tex.—The thermal deliverability of some long-distance gas-transmission lines could be increased from 20 to 30 per cent by reducing amount of nitrogen present in certain Mid-Continent natural gases.

This statement was made here last week before the annual spring meeting of the Natural Gas Department of the American Gas Association by E. F. Schmidt, vice president of Lone Star Gas Co., Dallas.

Schmidt, who is chairman of the technical and research committee, said the cost of removing nitrogen from natural gas could be economically supported by credits from concurrent L.P.G. recoveries.

Current interest in this research project, initiated back in 1947, is heightened by a more favorable market for L.P.G. and impending shortages of steel for pipe lines.

Extraction methods.—The most promising method of extraction was described by the engineer as the low-temperature-processing technique involving liquefaction and fractionation. Pilot-plant tests of this method, initiated at the Excel Helium plant near Amarillo, have confirmed its practicability and have provided some engineering data for design and operation of a commercial scale plant.

Although Schmidt said that the capital expenditures and operating costs for a commercial-scale plant cannot be closely estimated at present, he said that operating costs would range from 1½ to 4½ cents per M.c.f. in a plant designed to process 100,000,000 cu. ft. of gas per day for the removal of from 10 to 15 per cent of nitrogen. The investment cost would range from $1,500,000 to $4,500,000 for this size plant. These figures will apply to either the low-temperature or hypersorption processes, he said.

One explanation for the wide range in the costs of investments and operating costs for a nitrogen-removal plant was explained by Schmidt as being due to the lack of data upon which to base engineering calculations and design factors for nitrogen-removal plants.

P-V-T research.—Due for completion in July 1951 is another research project on pressure-volume-temperature relationships of the methane-nitrogen system now being conducted at the Institute of Gas Technology under A.G.A. auspices.

This project was set up to evaluate properties of mixtures of methane and nitrogen which are significant in engineering design and performance calculations.

Big-inch pipe.—A prediction that the 1950 production rate of 2,425,00 tons of transmission-pipe production will be exceeded during the present year and 1952 by the domestic pipe manufacturers was made by J. E. Goble, president of National Tube Co., Pittsburgh. He qualified his statement by stating that: "regardless of controls, if the international situation does not change to the extent that all present considerations are upset, steel will be made available by the authorities for pipe-line production in these amounts."

He said that 30-in. trunk-line pipe is being produced at a rate of more than 1,000,000 tons annually.

Gas turbines.—The first large-scale installation of gas-turbine-driven centrifugal-compressor stations for natural-gas pipe lines to be undertaken by El Paso Natural Gas Co. was explained by J. F. Eichelmann, chief engineer of El Paso Natural, and J. S. Quill, application engineer with General Electric Co., Schenectady, N. Y.

El Paso Natural will install seven 5,000-hp. gas-turbine-driven centrifugal-compressor stations for the first 100,000,000 cu. ft. per day increase in delivery capacity and 18 additional units for the future 200,000,000 cu. ft. per day increase. These installations will be made on that part of the El Paso Natural pipe-line system which extends from Jal, N. M., to Gila station, Arizona. This main line consists of a 26-in. and 30-in. pipe in parallel.

The decision to install this equipment was based in part on the high efficiency of centrifugal compressors at low compression ratio. Another factor was that the gas turbine station can be operated in the middle of the desert with no cooling water required except to replace very small losses in the recirculating oil cooling water system.

No Tide Water Merger

NEW YORK.—J. Paul Getty has told stockholders of Tide Water Associated Oil Co. that no merger of Tide Water and other companies is now contemplated.

Getty's statement was read by William F. Humphrey, Tide Water president, at the annual meeting here last week. Getty is president of Pacific Western Oil Corp. and Mission Development Co., which now hold majority interest in Tide Water.

Getty, in a letter read at the meeting, said no changes in such company policies are now contemplated. "I have confidence in the present management, and at present, I know of no reason prompting any changes therein. Although mergers of companies often result in greater operating efficiencies and reduction in expenses, there are no conditions apparent, at present, which would recommend a merger between Tide Water Associated Oil Co. and other companies, and none is contemplated at this time," he said.

Several amendments to the company charter relating to 1-year term of office for directors, limitation on issuance of stock, incurring of debt, prohibition against entering into employment contracts with any officer or director for more than 1 year, and the calling of special meetings at the request of a majority of the common stock, were approved by a substantial margin. The amendments had been proposed by the Getty interests.

Storage Boom

Underground "banks" soon to hold trillion cubic feet

DALLAS.—Within a few years the amount of natural gas stored underground in the United States will reach 1 trillion cubic feet with a maximum daily delivery of 3 billion cubic feet.

A. A. Cullman, assistant treasurer, Columbia Engineering Corp., New York, told members of the American Gas Association at their annual spring meeting here last week that the domestic gas industry had almost 350 billion cubic feet of gas in more than 100 underground storage reservoirs as of December 31, 1950.

Demand deposits.—These projects he spoke of as demand deposits in underground savings banks because the gas is safely there until we need it and it can be withdrawn on demand.

The speaker said that, in the Columbia system, "If present plans materialize," the investment in gas storage inventory within 2 years will become the second largest item on its balance sheet, exceeded only by the value of physical property.

Cullman stressed the importance of developing sound methods of determining the volume of gas in each of the storage pools as of given dates.

Inventory figure.—It is not enough merely to show that the average rock

pressures in a pool are at a certain figure or that the delivery from the field per pound lost in rock pressure is so much, he said, "unless the net result is the development of an inventory figure in M.c.f. which can be matched within reasonable limits with the inventory on the books."

The speaker called attention to the necessity for accurate recording of all storage withdrawals or losses. He cited a recent survey which indicated that there are at least 12 ways in which gas might leave a storage field other than through a correctly measuring meter.

Nonmetered losses.—He explained that companies with extensive storage operations may be faced with some substantial periodic inventory adjustments if these losses or uses are not recorded as they occur.

The list includes: blowing wells and drips, gas used by free gas customers in storage areas, gas used by pay gas customers in storage areas, gas lost in drilling, gas used in drilling, well or line blowups, gas lost in repairs to wells, inaccuracies of measurement, filling and purging lines connecting new wells and lines, opening frozen lines, loss of gas from storage fields to company owned producing wells and not accounted for as storage, and gas used by storage compressor stations in back of the measurement meter.

Smog Solution

Stewart tells A.P.I. refiners lead in solving community air-pollution problems, urges organized national attack

AT the largest meeting on record, 840 registrants at the sixteenth midyear meeting of the American Petroleum Institute, Division of Refining last week heard a balanced program on refining and related subjects.

In addition to internal developments on analysis, corrosion, waste disposal, electrical equipment and training, refiners also looked abroad to consider their relationship to the liquefied petroleum gas and automotive industries. They were further reminded of the responsibilities they share with other industry in the abatement of air pollution.

A.P.I. vice president for refining, W. L. Stewart, Jr., who is executive vice president of Union Oil Co. of California, devoted his address at the annual banquet to the subject of air pollution.

An expert on this subject, Stewart has served actively for 4 years on the Western Oil and Gas Association's Committee on Smoke and Fumes. In this age of greater concentration of population in industrial cities, the combination of automobiles, space heating units, back yard trash burners and industrial plants threatens in some cases to overburden the natural supply of air under certain geographical and climatic conditions. Stewart's case in point was Los Angeles and the now-famous smog which plagues that area.

Although an independent survey reported that 60 per cent of air pollutants can be traced to the automobile exhausts, chimneys, and trash burners of the general public, it was the refining industry, while operating within the antipollution law requirements, which took the lead in trying to solve the problem.

Spending many millions of dollars, refiners in the Los Angeles area have first made certain their own operations complied with the law. But they went further, sponsoring a fundamental study of the problem. This research project, undertaken by Stanford Research Institute was originally a 3-year program. It has now been in progress for 4 years and some of the answers, but not all, are being found, said Stewart.

W. L. Stewart, Jr., new A.P.I. vice president for refining, addressing the division's midyear meeting in Tulsa.

Stewart concluded that the industry's responsibilities to the community should not be limited to compliance with the legal letter of the law in the case of such a community problem. The unwritten laws of manners and morals, he said, calls for leadership from some segment of the community in finding basic causes and prescribing workable cures for such problems.

In assuming such leadership, Stewart declared that the petroleum industry can perform a signal service to communities throughout the country and thereby add a new facet to the all-important job of public relations. He suggested the formation of a national A.P.I. Committee on Smoke and Fumes which would play a leading role in solving other communities' air-pollution problems. Since such a program would mean the setting of new standards and would cost the industry millions of dollars, he said, it would comprise a vital new conception of public relations, based on community service.

Training trends.—To the progressive program of training the broad base of refinery operating personnel, the industry is today adding more and more projects aimed at aiding technical men to work more effectively. This growing trend in technical training was the subject of a special session at the 4-day meeting.

First results of a recent survey by Industrial Research Institute, Inc., were reported by H. G. Vesper and D. H. Etzler, of California Research Corp., San Francisco. Of nearly 100 companies surveyed, 20 per cent were found to conduct formal or organized training programs, while 80 per cent provide indoctrination programs for new employes and on-the-job training.

They concluded that a large area remains to be explored and developed in the training field, which is particularly pertinent at this time when industry is entering a period of restricted technical manpower availability.

Committees busy.—A total of 49 committee and subcommittee sessions were held over a 6-day period coinciding with the meeting.

The Automotive Research Committee heard progress reports on research projects concerning octane number requirements of passenger cars and commercial vehicles, diesel fuel behavior, and aviation fuel and lubricating oil characteristics, which projects are jointly sponsored by the A.P.I. and S.A.E. through the Coordinating Research Council. A new study of fuel detonation is being undertaken.

As the list of projects indicates, the joint investigations now under way concern primarily the studies of fuels and lubricants. The committee is of the opinion that the joint oil-automotive research program might include more projects studying equipment variables, to bring the overall program into better balance. It is believed that more research into equipment development might promote better utilization of current fuels and lubricants and thereby contribute to the long-range aim of the cooperative effort—service to the motoring public.

Reactive failures.—A subject of wide concern, discussed in formal and informal sessions at the meeting, was

the failure, both actual and threatened, of reactors in catalytic cracking service.

Graphitization of reactor shells near welds has already caused a few vessels to be taken out of service, and inspections of reactors over the country indicate that the trouble may not be restricted to any one type of metal or alloy, or any single design.

The lack of tensile strength and the eventual failure of reactor shells takes place at temperatures not hitherto considered hazardous, and an organized study of the unexpected trouble is under way.

1952 meeting.—The general committee, Division of Refining, is recommending to the A.P.I. board of directors that the seventeenth midyear meeting be held in San Francisco on May 12-15.

Stripper-Oil Need

Judd tells I.P.A.A. world situation soon may demand every barrel of producible oil, asks solution without price hike

DENVER.—The problem of how to make high-cost marginal wells productive without the incentive of higher crude prices was laid this week before the Independent Petroleum Association of America.

O. D. Judd, acting chief of the petroleum branch of the Office of Price Stabilization, told the I.P.A.A.'s midyear directors' meeting that "certain foreboding possibilities now assuming tangible shape" might soon make the production of every barrel of crude oil mandatory.

"In the event such a necessity presents itself, it is hoped the industry may have a workable plan ready to submit to make this production possible," Judd said.

Judd told more than 500 oil men registered that we now are producing about 1,000,000 bbl. daily under domestic requirements, that demand will spurt even further ahead of supply if the military increases its demands, and that there is every indication that increased military demands will be forthcoming.

"With conditions and future events as uncertain as they are, it is important that marginal production receive special and immediate attention," Judd said.

"Several thousand high-cost wells, involving thousands of barrels of much needed production, are now shut in. How and if such production should be made economical is a highly debatable question," he said, and not the function of the OPS.

But, he continued, a price increase would result in dangerous repercussions at consumer levels and adversely affect the entire industry.

Resolutions.—The I.P.A.A. adopted six resolutions, most of them concerned with federal activities affecting oil. The resolutions included:

1. Creation of a study committee, to be known as the Western Hemisphere Oil Study Committee, to make a comprehensive analysis of the oil situation from the standpoints of national and hemispheric defense. Expropriation in Iran and the threat of Russian domination of Middle East supplies were cited in pointing out the need for the study.

2. An appeal to Government for appointment of trade-association representatives to industry-advisory groups of governmental agencies. Lack of trade-association representation, the resolution said, denies thousands of the smaller units of industry the right to be heard in advisory-group activities.

3. Disapproval of enactment of the Harrison bill (HR 2191) "or any other legislation" which would increase the burden of the operators on federal lands by requiring payments to owners of surface rights other than as presently provided by law.

4. Support of Senate Bill 1029 providing for amendment of the Mineral Leasing Act for acquired lands to include lands set apart for military and naval purposes within the scope of that act.

5. Appeal to federal agencies to avoid discriminatory and unequitable price actions "that would threaten the future oil supplies upon which this nation depends, pointing out the present "disparity between oil prices and the price of other commodities."

6. Reemphasizing the I.P.A.A.'s basic policy on materials calling for, first, the allocation of sufficient steel to meet essential requirements; and second, the equitable distribution and efficient utilization of available steel. Also, that since there is an increasing need for expanded productive capacity, such additional materials be provided as needed to achieve national security as to oil.

Military fears.—Lt. Col. Ray W. Whitson, chief of the technical division of the petroleum section of the Department of Defense, told the independents that loss of our imports would mean either that this country would have to produce above maximum efficient rates or that additional large reserves would have to be found.

Whitson said we now have a cushion of 750,000 bbl. daily between actual production and the MER. Current net imports are 700,000 bbl. per day.

"Loss of any imports will cause our domestic production to bite into the small cushion. Loss of all imports, increased demand of the military, or additional foreign demands may require domestic production to exceed the MER of production unless new large reserves are located and developed."

C. E. Davis, left, Shell Oil Co., New York, chairman of the advisory committee of the A.P.I.'s Refining Division, presents award to G. G. Oberfell at the midyear meeting in Tulsa.

Refining Award

Oberfell receives A.P.I.'s certificate of appreciation

FOR his outstanding services to the American Petroleum Institute in the fields of automotive research and conservation of natural resources, G. G. Oberfell was awarded a Certificate of Appreciation by the A.P.I. Division of Refining at its sixteenth midyear meeting in Tulsa last week.

Oberfell, the sixth recipient of the high award, is now special consultant to the Reconstruction Finance Corp. on the synthetic-rubber program. He retired last July as vice president of research and development for Phillips Petroleum Co.

On joining Phillips in 1925, he established that company's research and development department, which became well-known in the industry for its work in the fields of natural gasoline, natural gas, and lighter hydrocarbons.

Following his graduation from Miami University, Oxford, Ohio, with a B.A. degree cum laude, he studied at the University of Chicago and the University of Pittsburgh. In 1947 he was awarded the honorary degree of doctor of science by Tulsa University.

Prior to joining Phillips, Oberfell was associated with the U. S. Bureau of Mines at Pittsburgh and Ohio Fuel Supply Co. at Columbus as chemist and with Chestnut & Smith, Tulsa, as research engineer. He entered the consulting field as a natural-gasoline engineer with Seeley-Oberfell Corp.

Safety on the Rig

Finger should be put on driller, backed up by management, men at A.A.O.D.C. clinic agree; old hazards discussed

Roy F. Carlson

DALLAS. — Oil - well drilling contractors are becoming more and more conscious of the benefits of operating safe equipment. At least they are if attendance and testimony given at this year's meeting of the safety clinic of the American Association of Drilling Contractors is any criterion.

The clinic, attended by nearly 200 drilling safety men, drilling superintendents, toolpushers, and representatives of safety-equipment manufacturers and casualty insurance companies, is devoted to discussion of safety programs, how they should operate, and how to make them operate in the desired manner.

There was disagreement about who is responsible for making a program function. It was suggested that, first of all, top management in a drilling company must be convinced of the necessity of a program. Safety men argue that this can be sold solely as a dollar-and-cents proposition because of savings of lost time, lowered insurance premiums, and a more efficient operation. The saving of lives and prevention of injuries make the program easier to sell.

Responsibility. — Once top management is convinced that a safety program is desirable, the safety men said, the finger must be put on a key man at each rig to make it work. The safety men can suggest changes to secure safe conditions, but since they are few in number, someone on the rig, either toolpusher, driller or roughneck, or someone from the field supervisory staff should have the responsibility for pursuing the program to achieve accident-free operation.

The majority opinion was that probably the driller should be given the responsibility — and be trained for this responsibility. The driller was designated because he is in constant attendance at the rig, he knows the personalities and the habits of all the men in his crew, and to some degree he represents management, particularly when the toolpusher is absent.

Although the driller may be given the responsibility at the rig, a successful safety program requires cooperation from the roughneck to the highest point in management, the safety men agreed. This is necessary if operating practices are to be kept safe and if proper equipment is to be made available to the roughneck. It was suggested, also, that rather than have the safety man be a rig policeman, all the rig workers should be made deeply safety conscious and be encouraged to find and report unsafe equipment and practices to the safety man, who should undertake, with management's help, their correction.

One of the essentials of making these safety programs work was pointed out to be securing the cooperation of the employe, and this it was said, can best be done by building high morale among drilling crews. This can be accomplished by management's demonstration of sincere interest in the employe's safety and general welfare.

Existing hazards. — Existing equipment hazards came in for their share of the discussion. Manufacturers pointed out that many of these faults are being corrected on new machinery. Danger in bad features on older equipment that must remain in service may be minimized by proper maintenance and by proper instruction of drilling crews about the hazards involved and how to avoid or treat them.

Frequent safety meetings on the rigs were termed a must in the pursuit of any training program, and it was suggested that attendance of everyone closely connected with the drilling operation be required.

Anderson Oil Co. Sold

NEW YORK. — The recently reorganized Stanwood Oil Corp. has bought the assets of Anderson Oil Co., Warren, Pa., consisting of producing properties in northwestern Pennsylvania along with scattered royalty and lease interests in the Southwest.

Included in the Pennsylvania acreage is a 2,000-acre tract surrounding the site of the Drake well near Titusville, according to Roe Wells, executive vice president of Stanwood.

M. E. Anderson, Warren, Pa., independent, who with his family owned the Anderson company, has taken a substantial interest in Stanwood as a part of the transaction and has become vice president in charge of field operations.

Pennsylvania properties consist of 32,000 proved acres with approximately 1,000 producing wells, located in Forest, McKean, Warren, Crawford, and Venango counties. Included is a local gas company serving Kinzu, Pa.

Outside Pennsylvania, the properties consist of royalties on a total of 115,000 acres, mostly in Oklahoma, Texas, and Louisiana, and a lease on 39,000 acres in the Fort Worth area on which drilling is planned in the near future, Wells said.

Stanwood was reorganized in December with John A. Kaye, New York banker, as president. In February and March it made three purchases of production from Pennsylvania independents, bringing the company's production up to about 1,600 bbl. a week. These consisted of 10,300 acres with 445 oil and gas wells. Prior to that time, Stanwood had production on 1,845 acres in Warren County.

Industry Briefs

NEW ORLEANS.—Red Bank Oil Co., which has properties in Illinois, Virginia, Louisiana, and Texas, has secured a permit for operations in Louisiana and plans to begin a drilling program soon in New Iberia field. Frank W. Bennett, president, said the firm is moving its executive offices from New York to New Orleans and that activities of allied oil interests eventually would be transferred here.

WASHINGTON. — Certificates of necessity for rapid amortization have been issued by Defense Production Administration to Cosden Petroleum Corp. for 85 per cent of a $2,950,000 investment for benzene-production units at Big Springs, Tex., and to Pure Oil Co. for 75 per cent of a $7,140,000 outlay for butane-production facilities at Toledo.

GRAND FORKS, N. D.—Discovery of oil in North Dakota has led to the introduction of three petroleum-geology courses in the state university here. Dr. Wilson M. Laird said a new professor will be added to the staff to teach petroleum geology, sedimentology, and micropaleontology.

NEW YORK.—A 13½-minute, 16-mm. film designed to keep oil-industry employes informed on the industry's ability to meet civilian-defense and military requirements has been completed and is now available to oil companies, the American Petroleum Institute announced this week. The film, "On Our Toes," is a combination slide and motion-picture presentation and is available to oil firms for $25 a print.

Iranian Oil Concern

HOUSTON. — Loss of Iranian oil would cut this nation's reserve-producing capacity about 300,000 bbl. daily down to 139,000 bbl., Ernest O. Thompson, of the Texas Railroad Commission, said here last week.

At present, he said, reserve capacity is only 439,000 bbl. daily, "the lowest I have ever known it." Last August, after the start of the Korean war, he said, reserve capacity was 1,113,000 bbl. daily.

William J. Murray, another Railroad Commission member, said he fears gasoline rationing might be necessary in this country if Iranian oil is lost to the western world.

The forecasts were based upon the

total loss of Iranian oil plus the assumption that the United States would undertake to supply western Europe with the crude and products it now receives from Iran.

In Washington, however, the Iranian ambassador said that after nationalization of Anglo-Iranian Oil Co. Iran will continue to sell oil to former purchasers in the same quantities that they bought between January 1, 1948, and March 20, 1951. *(See International.)*

Demand Forecast

I.P.A.A. puts 1951 daily demand at 7,415,000 bbl.

DENVER.—The I.P.A.A. economics committee, headed by H. B. Fell, estimated this week that total demand for the calendar year 1951 would average 7,415,000 bbl. daily, an increase of 9 per cent over demand in 1950.

Total demand for the summer quarters of this year will be up 8.2 per cent over last year, and winter demand will increase 5.2 per cent according to committee's forecast. Detail by products is shown in the accompanying table below.

To meet these demands, the required supply was estimated at 7,435,000 bbl. daily for the second quarter, 7,413,000 bbl. daily for the third, 7,561,000 bbl. daily for the fourth, and 7,702,000 bbl. daily for the first 3 months of 1952.

Inventories of 622,400,000 bbl. at the end of September are expected to include 255,000,000 bbl. of crude and 367,400,000 bbl. of products. For March 31, 1952, crude stocks are forecast at 245,000,000 bbl. and product stocks at 331,600,000 bbl.

FORECAST OF TOTAL DEMAND
(Thousands of barrels daily)

	Apr.-Sept.	Increase (%)	Oct.-Mar.	Increase (%)
Gasoline	3,275	10.0	2,955	6.9
Kerosine	245	8.4	475	5.6
Distillate	935	10.3	1,625	6.3
Residual	1,510	6.0	1,795	2.7
Other	1,125	4.5	1,035	3.2
All oils	7,090	8.2	7,885	5.2

Foreign-Refining Panel

WASHINGTON.—Industry assistance in dealing with foreign-refining problems is being sought by the Petroleum Administration for Defense through a panel of seven consultants appointed to advise George Barrou, chief of the foreign-refining division, on questions of supply and equipment.

The group, which held its first meeting with Barrou last week, consists of Jerry Cogan and Brian Mead, Standard Oil Co. (N.J.); Harry McCobb, Socony-Vacuum Oil Co., Inc.; William H. Farand, The Texas Co.; Robert L. Boggs, Gulf Oil Co.; Milton H. Lipp of California Texas Corp.; and John A. Walstrom, Asiatic Petroleum Co., Ltd.

ROCKY MOUNTAIN

New Water Flood

Carter to begin project in Cut Bank field on July 1

CUT BANK, Mont.—The first organized water flood in Montana will start about July 1 when Carter Oil Co. begins injecting water into the Lander sand reservoir at Cut Bank field, in Glacier County.

The project, located on the Blackfoot Indian Reservation, lies about 13 miles south of the Canadian border in the northwestern part of the state. Carter owns the entire working interest of the area to be flooded initially and plans to flood 350 acres in the first phase of operations and eventually a total of 600 acres. The flood covers the north half of the Lander sand reservoir on the west side of Cut Bank field in Sections 9, 10, 15, and 16-35n-6w.

Last week Carter completed coring operations on the first of a group of five input wells. Diamond coring is conducted with low-water-loss mud. Both electrical and radioactivity logs are run on completion.

Gravity flood.—Initially Carter will inject water into the casing from a single water-supply well drilled on a topographic high on the lease to the 500-ft. Eagle water sand. At first Carter will inject a total of 1,500 bbl. of water per day by gravity flow into the five wells, or an average of 300 bbl. per day.

If the initial phase of the flood proves successful, Carter contemplates increasing the flood to inject as much as 3,500 bbl. per day under pressure. Later, chemical-treatment equipment may be installed in addition to a pump.

Prolific reservoir.—The Lander reservoir has been prolific in past recovery. The discovery well, Santa Rita Oil & Gas Co. 1 Lander, C N½ SE 16-35n-6w, was completed in December 1935 through 7-in. pipe for an initial production of 1,300 bbl. per day; at the time it was the largest oil well to be completed in Montana.

By July 1940 the 11 wells in the Lander reservoir had produced 1,694,000 bbl. of oil, or about 9 per cent of the total production of the field to that date. Carter leases had produced more than 3,000,000 bbl. up to January 1, 1951. One well in this reservoir has produced 1,200,000 bbl.

Reservoir data.—The Lander oil reservoir is an isolated sand lens situated on the northwest flank of Cut Bank field. The lens probably grades into shale in all directions. Thickness of the sand ranges from 0 to 40 ft., with an arithmetic average of 12 ft. The oil reservoir extends for a distance of about 2 miles in length along a northeast-southwest trend. The width ranges up to a maximum of ½ mile.

The top of the Lander sand reservoir lies about 100 ft. above the Ellis shale; the Lander comprises the uppermost sandstone member of the Sunburst zone of Upper Cretaceous age. The average depth to production is 2,900 ft. Average porosity values are 18.74 per cent, although the range is from 12.5 to 23.5 per cent. Permeabilities range from 37 to 2,960 md., and the average connate water saturation is 15 per cent of pore space.

Amerada Has Twistoff

WILLISTON, N. D.—Deepening operations at the Williams County wildcat of Amerada Petroleum Corp. were temporarily delayed last week after drilling crews twisted off the drill pipe while drilling out cement plug above 11,673 ft.

The 1 Clarence Iverson had been producing through casing perforations from 11,630-60 ft.

Meanwhile, plans for the drilling of another well in the Tioga area were reported here by Critchell Parsons, Dallas operator. Parsons said a rig was being moved in for 1 Math Iverson, C NW NW 18-155n-95w, 1 mile south of the discovery well. Drilling is due to start by June 1. It is reported that the well will be contracted to a depth of 12,000 ft.

Parsons is associated with M. B. Rudman, also of Dallas. The partnership owns about 18,000 acres of oil leases and 3,000 acres of royalties in the area.

MID-CONTINENT

Hugoton Lease Offered

WASHINGTON.—Bids will be opened by the Bureau of Land Management May 23 for purchase of a lease on approximately 40 acres in Hugoton field, Morton County, Kansas.

The lease will be awarded to the qualified bidder of the highest cash bonus. Terms include payment of an annual rental of 25 cents per acre so long as the land is valuable for gas and $1 per acre if oil is found, plus a royalty payment of 12½ to 16⅔ per cent for gas and 12½ to 25 per cent for oil.

MIDDLE EAST

Iranian Outlook

Hysteria abates, but little chance for compromise seen; government expected to take over properties at any time

NATIONALIZATION, or more properly expropriation, of Anglo-Iranian Oil Co., Ltd.'s properties in Iran has been completed except for the important step of taking actual physical control of the operations.

It was expected that the 12-man government-management commission or its representatives would arrive at Abadan soon and announce that it was in charge. Reports last week end indicated the company's operations were normal and proceeding entirely as if there were no threat of immediate dispossession.

Iran's May Day passed quietly and without anticipated new outbreaks of violence. The new premier, Mohammed Mossadegh, took office and pledged his government to faithful execution of the nationalization law, which earlier received the senate's unanimous approval and the shah's signature.

Company's outlook bad. — Despite these signs of some abating of nationalistic hysteria and continued hopes for a compromise possibly in the form of a management contract or a mixed-company arrangement, the outlook for the company's future seemed poor. It appeared events have moved too far to allow the Iranians to back water without a tremendous loss of face.

In presenting his program to the Majlis, lower house of the parliament, Dr. Mossadegh said his government would allocate revenue from the oil enterprise so as to strengthen the economy and create the means for public ease and comfort.

Details of law.—Full details of the new nationalization law became known last week. It provides that Anglo-Iranian's purchasers will be allowed to continue to buy in the same amounts and at current international prices. This presumably includes Anglo-Iranian's own foreign distributing companies as well as non-affiliated purchasers.

To meet the company's claims for compensation, the management commission was authorized to set aside 25 per cent of net income. In this connection, an official of the Iranian Foreign Ministry's information section summoned correspondents in Teheran last week and complained against misrepresentation of Iran's case, one point being that the nationalization law was not expropriation since it contained the provision for compensation.

The commission is required to supervise the government's auditing of the company's books from March 20, date of passage of the first nationalization law, to the present. Iran claims that control of the enterprise passed to the government as of that date. The commission will handle the oil industry pending creation of a national company and is to complete its work and report to Parliament within 3 months.

Other developments.—Other developments in the Middle East oil situation last week were:

1. H. T. Kemp, London representative of the sheik of Kuwait, issued a statement emphasizing that the relations between the ruler and Kuwait Oil Co., Ltd., are completely friendly and that the sheik's request for a new royalty agreement along the lines of a 50-50 government split is "entirely unconnected with the Persian crisis." On the basis of a production of about 500,000 bbl. daily, a five-fold increase in royalties would give the sheik an income of about $84,000,000 a year. He rules some 150,000 subjects.

2. Herbert Morrison, British foreign secretary, disclosed in the House of Commons in London that Britain had proposed to the Iranians, as an alternative to nationalization, that a new British company be organized to handle Anglo-Iranian's operations in Iran as distinct from its other activities. The Iranian Government would be represented on the board, profits would be shared equally between the Iranian Government and the company, and a progressive increase would be made in the number of Iranians employed in the operations. The proposal apparently received no more consideration in Teheran than did earlier offers of the company.

3. In Dhahran, Saudi Arabia, Arabian American Oil Co. celebrated its twelfth birthday, and company officials spoke of a possible daily production of 800,000 bbl. by the end of the year. A $75,000,000 expansion program is being carried out this year.

New Units

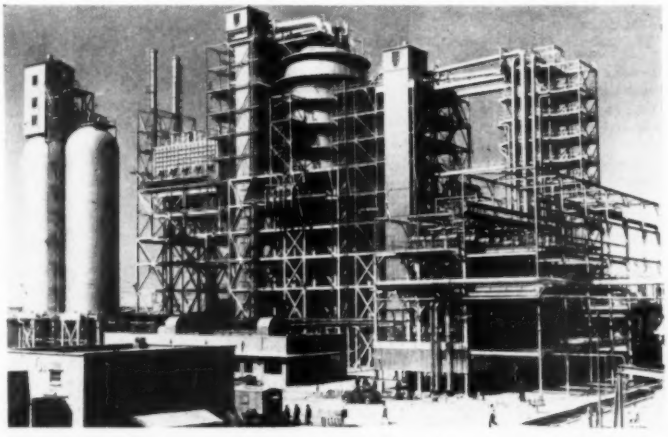
Cat cracker, gas-recovery units at Abadan operating

A NEW catalytic cracking unit and gas-recovery plant has started its first run in the Abadan, Iran, refinery of Anglo-Iranian Oil Co., Ltd.

The facilities were installed as a part of a project to improve the refinery's balance of white and black oils.

The throughput of the Abadan refinery is around 540,000 bbl. daily. The refinery is the world's largest, and its recent near shutdown as a result of labor trouble accompanying government moves to nationalize the company, had immediate repercussions in Eastern Hemisphere oil supply.

The new fluid unit was completed



NEW AT ABADAN.—Over-all view of the new fluid catalytic cracking unit taken a few days before it went on stream April 9.

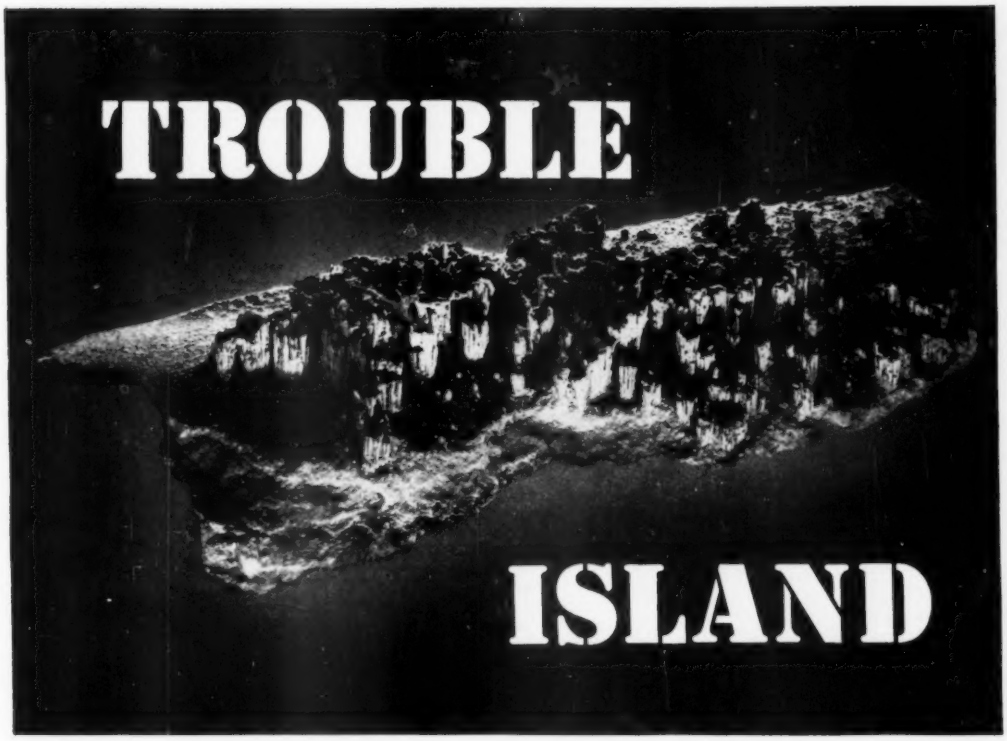


Photo is of a condenser-tube scale sample, about eight inches long. Solid scale is approximately ¼-inch thick, with "spires" ranging up to ⅜-inch height.

FIFTEEN years ago, this small island of trouble was part of a much larger open-box condenser problem at a refinery. Cooling water, running over 200°F. at outlet, contained 30 grains per gallon hardness and 20 parts per million iron. Tubes scaled heavily and rapidly without chemical inhibitor. Even with the best inhibitor then known, results were as illustrated above: partial inhibiting action creating the "spires" or forest-like deposits on tubes.

Considering this a challenge, Nalco sent a Doctor of Physical Chemistry—an expert water technologist—to the refinery. His weeks of work on the spot led to basically different treatment with new chemicals which cleaned up the condenser and kept it clean. Further Nalco research and development of chemical inhibitors has since enabled cooling systems to operate without scale or corrosion *with water hardnesses as high as 200 grains per gallon.*

Point is this: neither Nalco nor anyone else had an answer to scaling in that condenser. Nalco put the necessary brains to practical use and *got results* . . . benefiting, in the long run, not only that particular refinery, but every user of cooling water.

Whether your water treatment problem is unique, or stubborn plant-run, you will get prompt, decisive action from Nalco in the direction of positive results. Write or telephone today.

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at the end of March, before last month's strikes. Roughly 25,000 bbl. of wax distillate will be used for the unit. It is designed to operate on 25,000 bbl. daily input at 55 per cent conversion, up to 29,000 bbl. daily at 45 per cent conversion rate. Although it has not yet been pushed to anything like its full capacity, it is expected that eventually input may be increased to approximately 35,000 bbl. daily.

Apart from light and heavy gas oils and clarified oil, the new cracker will produce something like 10,000 bbl. daily of motor gasoline, and there will be a butane/butene product for use in the alkylation process and gasoline cuts available either for aviation or motor fuel.

The new unit was designed by Foster Wheeler Corp., and its gas-recovery plant by E. B. Badger & Sons Co. Over-all supervision of construction was in the hands of Foster Wheeler, which had a site force of about 25 American engineers. Assisting them in the job of directing the work of some 900 Iranian craftsmen were a number of A.I.O.C.'s British staff, engineers from E. B. Badger & Sons, and other specialists, including about 30 pipe fitters and riggers from the British firm of Matthew Hall & Co.

The cracking plant covers an area of 235 by 275 ft. and is 175 ft. in height, having 13 floors served by two elevators.

The regenerator, most important vessel from the standpoint of the unit's capacity, measures 47 ft. in diameter, and is one of the world's largest. One of the catalyst carrying lines is nearly 8 ft. in diameter.

The two catalyst storage hoppers have a capacity of 1,680 tons, and one is designed to take a temperature variation from atmosphere to 1,000° F. in a few minutes. This would come into use to take the catalyst should it become necessary to shut down the plant in an emergency. The gas-recovery plant has a capacity of 21,000,000 cu. ft. per stream day and eight compressors with a total of 3,000 hp.

LATIN AMERICA

Creole Levels Off

Stable operating rate sought to avoid slump

VENEZUELA'S major producer, Creole Petroleum Corp., is seeking to hold to a level rate of operations, and avoid a sharp buildup which might be followed by a drastic slump such as occurred in 1949.

At a recent meeting of the board of directors of the company in Caracas, it was decided that future expansion of the company should not exceed a normal rate of growth based on historical trends unless a world emergency develops. This decision was in accordance with a recommendation made by Dr. Siro Vazquez, head of the production department.

Stability.—In reviewing future operations, Dr. Vazquez stressed that, while no company or national industry could isolate itself from world-market conditions and achieve stability by itself, Creole could and would take all possible steps to moderate the effects upon itself from world-demand variations.

The production official said Creole's future production plans are geared to hold employment as stable as possible, and to maintain company personnel at about its present level during the next 5 years unless very great shifts in world demand occur.

Exploration.—Stable operations will depend upon the continued discovery of more oil than is produced with additions to net reserves. The company's problem in this respect is in eastern Venezuela where production rates in its two principal fields, Quiriquire and Jusepin, can be expected to decline during the next 5 years. To offset this, the company has initiated an exploratory program in the swamp areas of Guanoco, Guanipa, and Pedernales.

Another step contributing to greater stability of Creole's operations is addition of more storage capacity. Dr. Vazquez pointed out that this will allow production to be maintained at a more even level despite fluctuations in demand. At present, Creole is adding 1,200,000 bbl. to its existing storage capacity, he said.

Brazilian Expansion

Private group seeking help for another new refinery

A PRIVATE Brazilian group, Refineria e Exploracao de Petroleo Uniao, is now seeking priorities assistance in Washington for materials for the construction of a 20,000-bbl. daily refinery on the outskirts of Sao Paulo.

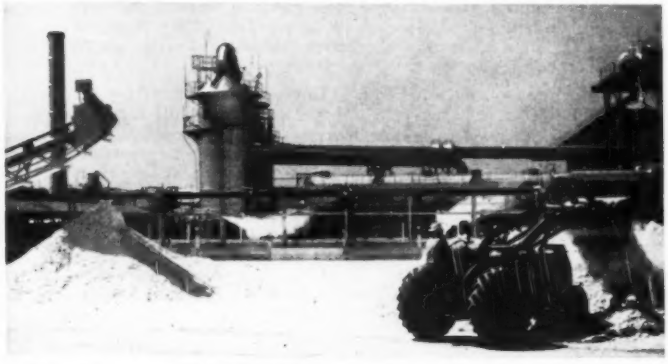
The backers of the corporation have held a concession from the government for several years for the construction of a Sao Paulo refinery. They have arranged with Hydrocarbon Research, Inc., for engineering and procurement of equipment.

Start of the project is uncertain, depending on whether materials can be obtained with a rating in the United States or whether they must be sought in Europe. About 2 years would be required for construction.

As planned, the refinery includes T.C.C. catalytic cracking, gas-recovery, catalytic polymerization, treating, and auxiliary facilities. It would be able to operate on Middle East or Venezuelan crude.

Other construction.—Hydrocarbon Research also is handling construction of the 45,000-bbl. daily refinery which Brazil's Conselho Nacional do Petroleo is building at Cubatao, near Santos, Sao Paulo's coastal port. Site for this project has been cleared; work of erecting process units is expected to begin this fall, contingent on the scheduled receipt of materials which have been ordered in France.

The Sao Paulo refinery planned by the private group is the fourth refinery built or projected in Brazil. The conselho is expanding its new Bahia plant to 5,000 bbl. daily with



Sulfur-Extraction Plant Begins Operation

The largest plant in the world for the recovery of sulfur from natural gas has gone into operation in Poza Rica field, Mexico. The pile of sulfur shown above is a part of its daily 140-ton output. The plant processes 120,000,000 cu. ft. daily of the sour gas produced in Poza Rica field before it is moved by pipe line to Mexico City. Officials of Petroleos Mexicanos said the plant was designed for a daily production of 130 tons, but can be operated to produce as much as 150 tons.

M. W. Kellogg as contractor. Kellogg also has the contract to build a 20,000-bbl. daily refinery for a private group which holds a government concession for the project in Rio de Janeiro.

Costa Rican Contract

Union Oil Co. of California has signed a contract with the Government of Costa Rica giving the company exclusive exploration rights in the Costa Rican provinces of Limon and Guanacaste.

In announcing the contract, Reese Taylor, Union president, said the contract yet had to be ratified by the Congress of Costa Rica.

Taylor said it is a "fair and reciprocal document providing maximum safeguards and guarantees to both parties." The Costa Rican president and minister of industry also have stated their complete satisfaction with the agreement.

Union's last major exploratory effort outside the United States and Canada was in Paraguay, where it abandoned its program in 1949 after some 5 years of work and the drilling of five wells.

Costa Rica's Limon basin in the Southeast has a history of exploration including the drilling of several wells in the twenties. Some of these had minor oil shows and one produced gas. The basin is described as an extension of the Bocas del Toro basin of Panama. Guanacaste is on the other, or Pacific, side of the country bordering Nicaragua.

Costa Rica is considered geologically to be a rank wildcat prospect. Generally, the country consists of a mountainous backbone with Miocene and Oligocene sedimentary basins on either coast. Standard Oil Co. (N. J.) was interested in the country in the early forties to the extent of asking the government to pass legislation clearing up the question of subsurface rights.

Products Line for Ecuador

Preliminary engineering work has been done by Ecuador Railroad (Empresa de Ferrocarriles Ecuatorianos) on a 50-mile, 4-in. products pipe line from Guayaquil to Palmira, Ecuador.

The line will extend from the seacoast to a terminus at an elevation of 10,000 ft. Construction has been contracted by J. A. Jones, Charlotte, N. C.

Gasoline Line Under Way

Yacimientos Petroliferos Fiscales, the Argentine state oil agency, is building a pipe line to carry motor fuel from its La Plata refinery to the city of Buenos Aires.

The 35-mile line will have a capacity of about 18,800 bbl. daily. It involves an expenditure of 9,600,000 pesos and is expected to be in operation by June.

Pemex Plans 100-Mile Line

Petroleos Mexicanos is preparing to lay a 100-mile crude-oil line on the Isthmus of Tehuantepec, from Jose Colomo 1, discovery well near Macuspana, Mexico, on the Cilapa River, to terminate at El Plan field, near the Minatitlan refinery of Pemex.

AFRICA

Plans for Durban

Standard-Vacuum discloses details of new refinery

STANDARD - VACUUM OIL CO.'S new Durban, South Africa, refinery will embrace several new principles and will probably consist of a single integrated unit combining the functions of distillation, naphtha reforming, and fluid catalytic cracking.

The company made this statement last week in amplifying the original announcement of its plans to construct what will be the first petroleum refinery in the Union of South Africa *(The Oil and Gas Journal, March 1, page 36)*.

Process designs and construction plans are now being developed. The main contract will not be awarded for several months. Ground-breaking will start early next year, and the plant should be ready to go on stream late in 1953 or early in 1954.

The refinery will be built and operated by a new company, Standard-Vacuum Refining Co. of South Africa, Ltd. It will occupy a 214-acre site at Wentworth, an industrial suburb of Durban. Capacity will be about 10,000 bbl. daily, and the cost will approximate $12,500,000. Essentially a fuels refinery, products will range from gasoline to heavy bunker fuel.

To the maximum extent possible, the project will utilize South African subcontractors, materials, and supplies. The eventual operating force will be about 400, with about 1,000 employed during the peak of construction.

The Durban site was selected because of the deep-water facilities for tankers. Vacuum Oil Co. of South Africa, Ltd., the present Standard-Vacuum marketing company, now has a terminal at Durban which will be expanded and eventually connected with the new refinery by a 4½-mile pipe line for movement of crude. The refinery is expected to operate on Middle East crude.

EUROPE

German Reserves Climb

Crude-oil reserves of Western Germany now amount to 38,025,000 tons, an increase of 1,500,000 tons during the last year, according to the latest estimates of the Germany Geological Survey.

The new reserves total is equivalent to approximately 270,000,000 bbl. Of total, 72 per cent is classified as proved, and the remainder as probable. A year ago, the proved total made up only 60 per cent. Emsland has the largest reserves of any area, 18,900,000 tons proved and approximately 7,000,000 tons probable. Due to discoveries in Eldingen and Hohne, total reserves of the Hanover area showed a rise of 2,000,000 tons to approximately 10,200,000 tons.

Argentine Compressor Station

Shown here is the exterior of a new compressor station at Comodoro Rivadavia in southern Argentina. The station, and a booster station now being built at General Conesa, serve the 1,100-mile, 10-in. natural-gas line completed late in 1949 by the Argentine State Gas Administration from Comodoro Rivadavia to Buenos Aires. This main Comodoro Rivadavia station, built by Agar, Cross & Co., Ltd., will ultimately contain 10 Worthington LTC-6 angle-type gas-engine compressors of 800 hp. each. The two-stage station has an outlet pressure of 1,000 psi.

CHEMICO OFFERS AN ECONOMICAL PROCESS FOR

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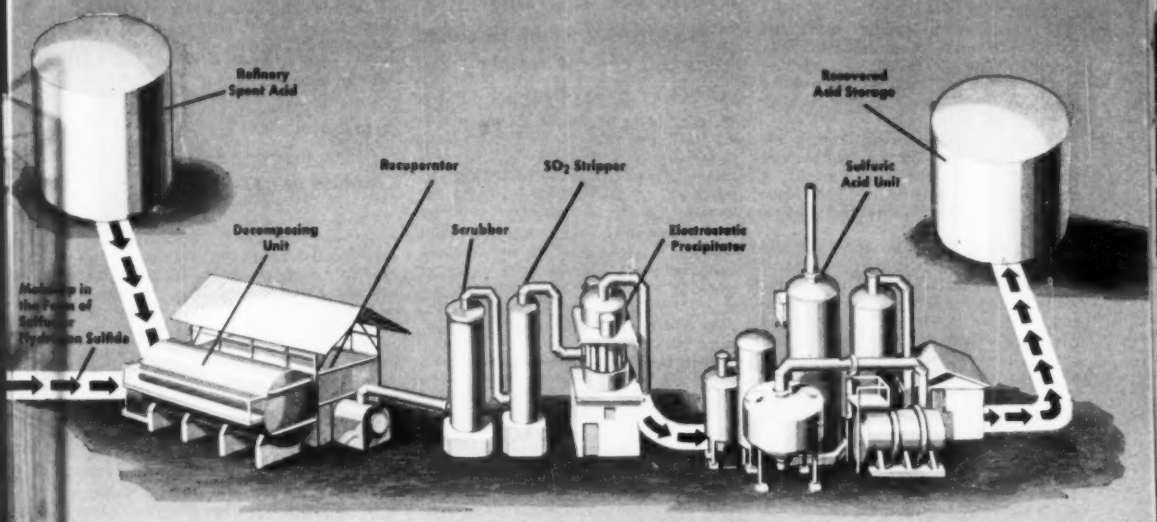

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In this process, spent alkylation acid—now in greater supply as a result of the increased manufacture of high octane gasoline—is sprayed into a furnace maintained at a high heat with auxiliary burners. Sulfur or hydrogen sulfide may be used as fuel thereby producing SO_2 gas for the production of make-up acid.

A limited amount of other liquid acid sludges, high in hydrocarbon content, may also be added to the alkylation spent acid, thus providing fuel as well as additional acid production. The hydrocarbons are completely consumed and the acid is broken down into its components—sulfur dioxide, oxygen and water. After the water is removed, the gas is processed to fresh acid of 98% strength in a Chemico contact sulfuric acid unit. Send for additional information, stating your requirements.

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PERSONALS

Industry Leader

Charles Hill heads Rocky Mountain Oil Association

A LEADER for many years in the Rocky Mountain oil industry is Charles S. Hill, Rocky Mountain Oil and Gas Association president. He is also vice president of the Independent Petroleum Association of America for the State of Colorado and is a director of the American Petroleum Institute.

Hill became active in the petroleum industry in 1923 and continues as a progressive industry operator at this time. He now headquarters from Denver, but the major share of his petroleum interests are in Wyoming, where he has been credited with the discovery of several fields as an active wildcatter.

He spent his early years working as a telegrapher for Union Pacific Railroad. He later became interested in the sugar industry and joined Eccles Sugar Interests in the Big Horn Basin. After serving in World War I he returned to Wyoming and was appointed Commissioner of Immigration. Following this assignment, he returned to railroading for several years before entering the oil industry.

John E. Eckel, formerly president of Petroleum Mechanical Development Co. at Houston, has joined Carter Oil Co. at Tulsa as drilling research group leader.

Morton N. D'Evelyn, consulting petroleum engineer and geologist at Bakersfield, Calif., has been named vice president and general manager of M. J. & M. M. Consolidated. He will head the company's California operations from new offices in Bakersfield.

Dr. Ralph C. Tallman has been named director of research for Lion Oil Co., replacing **Dr. Frank J. Soday,** who has headed the research division since 1947. Soday resigned, effective May 15, to assume the post of director of research for Chemstrand Corp. Tallman has been manager of the planning and survey department of Lion Oil's research division since June 1950.

J. H. Thacher, Southern district producing manager for Standard Oil Co. of California, has been appointed executive assistant to the vice president. In this capacity he will handle work in connection with the firm's Elk Hills operating contract with the Navy. Other personnel changes include: **W. C. Johnson,** named manager of the southern district; **M. W. Morris,** appointed general superintendent of the southern district; and **K. B. McNamara,** named district petroleum engineer of the southern district.

Tom Curtis, assistant division engineer, **Ray Courtright,** unitization section engineer, and **E. L. Chapin,** senior petroleum engineer, have joined Stanolind Oil & Gas Co.'s North Texas-New Mexico division with headquarters in Fort Worth.

A. G. DeMont, general manager of Imperial Oil Co.'s marketing department, has been elected a director, succeeding **Dr. O. B. Hopkins,** vice president. Hopkins asked not to be nominated because he is devoting an increasing amount of time to government duties as director of the petroleum division of Canada's Department of Defense Production.

C. A. Ward, district superintendent for Continental Oil Co. at Beeville, Tex., has been transferred to the new district office at Brownfield, Tex., in the same capacity.

Fred C. Hanker, Jr., formerly process engineer with Standard Oil Development Co., has joined Catalytic Construction Co. as assistant to the president at Philadelphia. During the early 1940's he was active in design and installation of aviation-gasoline facilities for Standard Oil Co. (N. J.) interests. From 1944 to 1948 he was with Carter Oil Co. as assistant to the vice president in charge of manufacturing.

J. J. Haverfield, geologist for Continental Oil Co., has been transferred from Elko, Nev., to Salt Lake City, Utah.

Owen Fauntleroy, Jr., formerly with J. M. Huber Corp. at Wichita, Kans., has joined William Ross Cabeen & Associates, consulting geologists and engineers, at the firm's home office in North Hollywood, Calif.

H. F. Patterson, field seismograph supervisor for Stanolind Oil & Gas Co., will be in charge of the newly established geophysical interpretative office in San Angelo, Tex.

William G. Rogers, executive vice president of East Ohio Gas Co. at Cleveland, has been elected president of the firm, succeeding **J. French Robinson,** who was elected chairman of the board. Rogers, who worked his way upward during 37 years of service, joined the firm as a beginner in the engineering department in 1917. He was named assistant secretary in

W. G. ROGERS

J. F. ROBINSON

1931, and secretary-treasurer in 1933. In 1939 he was elected vice president and last year was promoted to executive vice president. Robinson, who has spent more than 30 years with Consolidated Natural Gas Co.'s group of companies, formerly owned by Standard Oil Co. (N. J.), was elected president of East Ohio in 1940. He previously had served as president of Peoples Natural Gas Co. and New York Natural Gas Corp. with headquarters in Pittsburgh.

John D. Foster, engineering department of Service Pipe Line Co., has been promoted to area engineer for the company's Illinois and Missouri divisions, headquartering in Galesburg, Ill. He first joined the firm in 1940.

J. M. McLaughlin, production foreman for Magnolia Petroleum Co., has been transferred from Imperial to Snyder, Tex., in the same capacity.

Cecil L. Albert has been named new area manager of Gulf Refining Co.'s exploration department at Saginaw, Mich., succeeding **W. P. Clarke,** who retired after serving with Gulf for the past 35 years. After attending the University of Oklahoma, Albert joined the old Gypsy Oil Co., which later became Gulf Oil Co., as a scout. He served 12 years for Gulf in Kansas as landman, and then was transferred to Indianapolis as assistant general agent for the eastern production division. After 6 years in Indiana he was

PERSONALS

dispatched to New Mexico as zone agent and served in that capacity for 6 years. The past 18 months he has been a member of Gulf's job-evaluation committee at Tulsa.

Warren A. Beman, of the chemical-products division, has been appointed to direct chemical-products development for Socony-Vacuum Oil Co., Inc. A chemical engineering graduate of Purdue University, Beman previously worked in refinery engineering and development section of Socony-Vacuum Laboratories.

Dean A. McGee, executive vice president of Kerr-McGee Oil Industries, Inc., has been presented the Erasmus Howard distinguished alumni award from the University of Kansas. The award is made in recognition of "distinguished careers in the field of geology." He is credited with developing water-surface seismograph "shooting" in open waters of the Gulf of Mexico.

Albert S. Munneke, Oklahoma division area engineer for Service Pipe Line Co., has been transferred to Casper, Wyo., as superintendent of the firm's Salt Creek district. Munneke, who has been with the frim since 1940, replaces **S. L. Cox,** who has joined the products pipe-line department of Standard Oil Co. (Ind.). **Elliston H. Brewer,** Shawnee, Okla., has been named area engineer for Oklahoma, replacing Munneke. **C. F. Gearhart, Jr.,** area engineer of Service Pipe Line's Wyoming division, also has accepted a position with Standard of Indiana's products pipe-line department. **John H. Keyes, Jr.,** was promoted from oil traffic engineer to replace Gearhart, and **Morrison Hynd,** an engineer in the Casper office, was promoted to oil traffic engineer. **William C. Cooper,** engineer in the Casper office, has been transferred to the firm's Missouri division with headquarters in Carrollton.

Herbert E. Fisher, Chicago, chief engineer of the products pipe-line department of Standard Oil Co. (Ind.), has been appointed supervisor of planning for Service Pipe Line Co. at Tulsa. Fisher attended Oklahoma University and joined Service in 1932 as a laborer. He advanced through various positions in the firm's engineering department until 1942 when he joined Standard.

John J. O'Keeffe, formerly northern division superintendent for Kern Oil Co., Ltd., at Bakersfield, Calif., has joined **Edwin W. Pauley** as manager of drilling and production operations in the Northeast Mexico division with headquarters at Reynosa, Tamps.

V. A. Peterson, supervisor of geophysical operations for Sinclair Oil & Gas Co. at Tulsa, has been appointed division geologist for the central division with headquarters in Tulsa. After graduating from Colorado School of Mines in 1930 he joined Sun Oil Co. as control geophysicist in torsion balance. In 1932 he joined Cities Service Oil Co., remaining with it until 1933 when he became a gravity meter and seismic party chief for Continental Oil Co. From 1945 to 1948 he was seismic party chief and district supervisor for Atlantic Refining Co., joining Sinclair in 1948 at Denver.

Frank T. Clark, division geologist at Fort Worth, Tex., for Cities Service Oil Co., has been appointed chief geol-

FRANK T. CLARK

FRANK COOTER

ogist of the firm. **Frank Cooter** has been appointed to the new position of exploration field division manager at Fort Worth. Clark joined the company in 1924 as Kansas division geologist. After serving 11 years in this position, he was transferred to San Angelo as West Texas district geologist. In 1948 he was named division geologist in Fort Worth. Cooter joined the firm in 1928 and has been division landman at Fort Worth for the past 3 years.

Jack L. Roach has been appointed manager of the land and exploration service department for Deep Rock Oil Corp. Roach has had 12 years of experience in geological and drafting work for Pure Oil Co. in Tulsa.

Leverett Sacre, formerly a geologist with Standard Oil Co. of California, at Taft, Calif., has resigned to affiliate with **Ted Easton** in the consulting firm of Easton & Sacre with offices in Bakersfield, Calif.

W. C. Lehman, independent geologist, has moved his offices from Seattle, Wash., to Beverly Hills, Calif.

Ray C. Lewis, chief geologist for Houston Oil Co., has been appointed to the newly created position of manager of exploration in charge of the geological, geophysical, and land departments. Lewis graduated from University of California and served in various capacities in the geological department of Stanolind Oil & Gas Co. prior to joining Houston as chief geologist in 1945. **Wendell L. Lewis,** formerly staff geologist, has been promoted to chief geologist. He was employed by the company as a field geologist following his graduation in geology from University of Nebraska in 1941.

James W. Adams, Jr., Shreveport, La., geologist, has joined the production department of Houston Natural Gas Corp. at Corpus Christi, Tex.

Kenneth Fellows has been named secretary of Houston Natural Gas Corp., and **John B. Cookenboo,** controller of the firm, has been named treasurer.

N. W. Pape, district foreman, has been placed in charge of Shell Oil Co.'s newly created district production office at Victoria, Tex.

Thomas E. Cantrall, former Tulsa district transmission superintendent for Oklahoma Natural Gas Co., has been promoted to district superintendent, succeeding **W. A. Hazard,** who has retired after 33 years with the company. Cantrall joined O.N.G. in 1925 as production man in Chanute, Kans., was promoted to district transmission superintendent in 1933, and was made district superintendent in 1935.

W. D. Thomas, Jr., has been appointed a technical representative of the petroleum chemicals department of American Cyanamid Co. Thomas joined the firm in 1940 as a member of the newly formed petroleum chemicals laboratory at the firm's Stamford, Conn., research laboratories. **J. B. Peeso, Jr.,** succeeds Thomas as group leader of the petroleum chemicals laboratory.

Sam H. Casey, assistant to the executive vice president of Pan-Am Southern Corp., has been elected a member of the board of directors. Before joining Pan-Am in 1948, Casey was with Sohio Petroleum Co. in the crude-oil purchasing department. The old directors were all reelected to the board.

D. N. Chaflin has been named research laboratory supervisor in charge of administration and service at Shell Oil Co.'s refinery-research laboratory at Houston. **J. D. Heldman** has been appointed chief research technologist to handle catalytic and thermal cracking. He will be assisted by **F. Kunreuther. G. P. Hinds** has been named chief research chemist in charge of distillation, analytical research, and lube and wax products and processes. He will be assisted by **E. L. Claridge.**

PERSONALS

M. E. Hawkins, petroleum engineer for Bureau of Mines, has been transferred from Bartlesville, Okla., to Dallas.

E. J. Dorgan, Louisiana division manager for Pan-Am Southern Corp., has been named Mississippi division manager succeeding **Frank S. Cannon** who has retired.

W. C. Hewitt, manager of the Plains butadiene plant, near Borger, Tex., of Phillips Chemical Co., subsidiary of Phillips Petroleum Co., has been placed on special assignments in connection with the national synthetic rubber program. **A. B. Leonard,** superintendent of Cactus plant, near Etter, Tex., has succeeded Hewitt as manager of the Plains plant. **T. M. Hipp,** assistant superintendent of the Cactus plant, has been promoted to superintendent of the plant. **C. W. Foreman,** manufacturing superintendent at Cactus plant, has been promoted to assistant superintendent. **E. C. Ayers,** superintendent of Adams Terminal, near Houston, has been promoted to chief process engineer of Phillips Chemical. **R. G. Rhodes,** process superintendent at the Plains plant, has been promoted to superintendent of Adams Terminal. **A. F. Legatski,** process superintendent at Cactus plant, has been named superintendent of the sulfur plant which will be constructed in West Texas.

Herbert F. Miller has joined Rock Island Refining Corp., Indianapolis, Ind., as district manager of its crude-oil department, with offices in Tulsa. Miller retired from Carter Oil Co. on February 1 as manager of the crude-oil purchasing department, and vice president and director. He had been with the firm 48 years.

V. C. Watson, tool pusher for Penrod Drilling Co., has been transferred from Sulphur Springs to Karnes City, Tex.

Jack Hodges, construction superintendent for Western Pipe Line Constructors, Inc., has been transferred from Angleton, Tex., to Dickson, Tenn.

George S. Young, executive vice president of Columbia Gas System, Inc., has been elected president. He succeeds **Stuart M. Crocker,** who was named to the new post of board chairman in which capacity he will continue as chief executive officer. Young began his service with the system in 1930 as a junior engineer. He became vice president and general manager of Michigan Gas Transmission Corp., former Columbia subsidiary, in 1936, and in 1942 he was made a vice president of Columbia Engineering Corp.

REFINING ADVISORY GROUP.—The advisory committee of the A.P.I. Division of Refining as it met in Tulsa to discuss the extent and scope of committee and subcommittee meetings at the forthcoming annual meeting in November. Clockwise around the table are R. N. Giles, Standard Oil Co. (Ind.), Chicago; E. B. McConnell, Standard Oil Co. (Ohio), Cleveland; A. J. Ely, Standard Oil Development Co., Linden, N. J.; Taylor M. Rushing, The Texas Co., New York; W. M. Holaday, Socony-Vacuum Oil Co., Inc., New York; David E. Day, Richfield Oil Corp., Los Angeles; Michael Halpern, The Texas Co., New York; C. E. Davis, committee chairman, Shell Oil Co., New York; W. T. Gunn, A.P.I., New York; H. Y. Hyde, Tide Water Associated Oil Co., San Francisco; John T. McCoy, Tide Water Associated Oil Co., Bayonne; Albert E. Miller, Sinclair Refining Co., New York; E. L. Baldeschwieler, Standard Oil Development Co., Linden; Dan M. Krausse, Cosden Petroleum Corp., Big Spring; M. G. Paulus, Standard Oil Co. (Ind), Chicago; and George A. Davidson, Standard Oil Co. of California, San Francisco.

George A. Wilson, president of Interstate Natural Gas Co., Baton Rouge, La., and **F. T. Parks,** vice president of Public Service Co. of Colorado, Denver, have been appointed members of the Gas Industry Advisory Council. Parks will serve in place of **J. E. Loiseau,** president of Colorado Public Service, who withdrew in his favor.

L. H. Proctor, foreman for Magnolia Petroleum Co., has been transferred from Luling to Imperial, Tex.

DEATHS

Albert Edward Gibson, 68, engaged in pipe-line construction and drilling in the Persian fields from 1908 to 1913, and later a driller in Burma and Java, died at Petrolia, Ont., recently.

John H. Edwards, Sr., 80, retired Tulsa oil operator, died May 6 in Tulsa. Before retiring from the oil business in 1932, he had extensive oil operations in Pawnee County, Oklahoma.

John Cummins Miller, 55, Houston consulting geologist, died May 2.

R. L. Hammil, 69, retired oil man who pioneered in Spindletop field, died May 1.

Franklin T. Rainey, 57, vice president of East Tennessee Natural Gas Co., died May 2 in Toledo, Ohio. Rainey was general chairman of the Industrial Gas Committee of the American Gas Association.

Herbert Albert Rachuig, 45, chief engineer for Humble Pipe Line Co. at Warda, Tex., died April 26.

Walter W. Larsh, who served in the geological department of Stanolind Oil & Gas Co. for many years and later operated as a consulting geologist with offices in Wichita, Kans., died recently.

Rubert J. Lindquist, 48, financial vice president of Standard Oil Co. (Ind.), died May 5. He became financial vice president of the firm in 1945 and a director in 1946.

Frank Benjamin Martin, 66, retired employe of Gulf Oil Corp., died May 2.

Emry E. Roper, 75, founder of Roper Petroleum Co., died April 28.

Well Interference Supports Wide Spacing

Five examples illustrate definite production interference between wells 660 to 1,400 ft. apart. It is concluded that in these examples wells were spaced closer than necessary from the standpoint of ultimate recovery of oil from pool.

by George R. Elliott

SOME of the confusion which has arisen in the discussion of the well-spacing problem can be resolved if three statements are clearly understood. First: A field will recover additional oil by additional wells when such wells penetrate undeveloped zones. Second: The lease with more wells "captures" oil from the lease with fewer wells. Third: It is sometimes profitable to drill additional wells merely to take advantage of increased current-production rate.

The first statement is with respect to a field having more than one producing zone or reservoir. No disagreement exists on the necessity of drilling wells to develop every separate reservoir. A field may have been completely drilled up on uniform spacing and may have produced for several years. It would be a normal course of development to drill additional wells for completion in a separate producing zone stratigraphically above or below the previously developed horizon.

The second statement in recognizing "capture" behavior will help to avoid the mistake of accepting increased lease recoveries as an indication of increased pool recoveries. The fact of regional migration has been accepted since the earliest days of the petroleum industry.

An 1878 ruling of a Pennsylvania court became the "rule of capture," viz., "Petroleum gas and oil . . . belong to the owner of the land, and are part of it, so long as they are on it or in it . . . but when they escape and go into other land . . . the title of the former owner is gone. If the adjoining owner drills his own land and taps a deposit of oil and gas, extending under his neighbor's field, so that it comes into his own well, it becomes his property."

The first result of the acceptance of regional migration was the drilling of additional wells to protect leases from loss of oil to offset wells. More recently, it has been realized that although regional migration directly caused close spacing, the same cause provided one of the strongest arguments for wider spacing. If, on a lease basis, it is necessary to drill a well to keep oil from being produced by a well on another lease, then on a pool basis one of these wells is not needed.

The third statement considers the present worth factor of the money to be received from sale of the oil when justifying the cost of drilling the additional wells. It may be profitable to increase the well density even though no additional ultimate recovery is obtained. This will be true when additional wells permit the lease a higher production rate, and when this higher production rate results in a sufficient increase in the present worth to return a profit on the increased investment.

Initial producing rates.—In the completion of new wells in old pools relatively high initial-producing rates attract attention. These are sometimes erroneously considered as reflecting ultimate recovery. It is useful to remember that initial potential is controlled by well-bore conditions. This varies directly as the specific permeability; as the difference in pressure between the reservoir and the well

THE AUTHOR

George R. Elliott joined the production department of Phillips Petroleum Co., Bartlesville, Okla., in 1936, where he has been continuously associated with reservoir studies and their application to oil-field problems. Receiving his B.A.Sc. degree from University of Toronto, Elliott did graduate work at Columbia University. Prior to joining Phillips he spent 14 years in varied work in Oklahoma, California, and Alberta. This paper was presented at the spring meeting of the Mid-Continent District, American Petroleum Institute's Division of Production, at Amarillo, March 21-23.

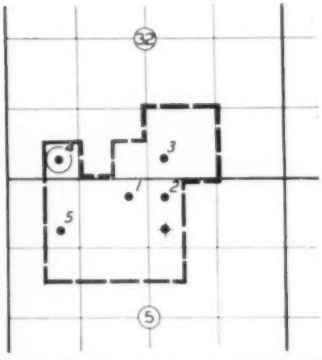


Fig. 1—March pool: Early development status.

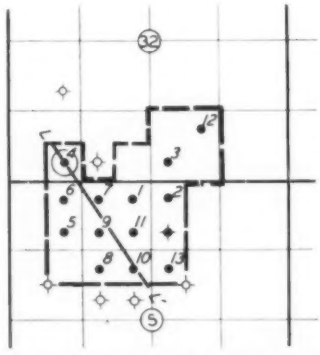


Fig. 2—March pool: Development status, April 1950.

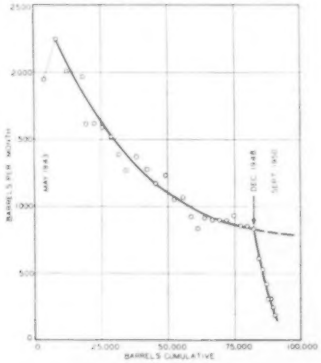


Fig. 3—March pool: Well No. 4, production (rate-cumulative): interference from late wells.

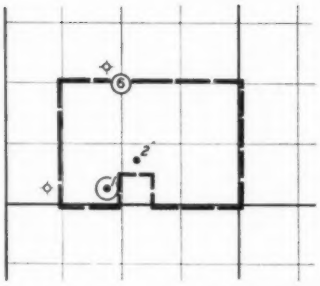


Fig. 4—Grayson pool: Early development status.

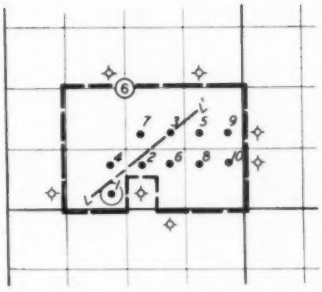


Fig. 5—Grayson pool: Complete development, 1950.

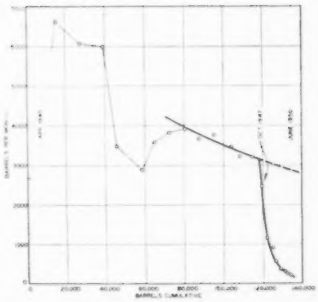


Fig. 6—Grayson pool: Well No. 1, production (rate-cumulative); interference from late wells.

bore; as the relative permeability of the formation to oil.

It is also important to consider the more effective later completion methods as compared with those employed in earlier years; relatively high initial-production rates may result from those improved completions. Another common reason for reported high initial rates arises from basing those rates on short test periods.

When wells produce unrestricted, definite decline curves are established which become sensitive indicators for interference effect from later wells. The most striking examples of interference should be found where the permeabilities are the highest. The difficulty here is that high-permeability wells are high-potential wells and fall under proration. This obscures the interference effect in the cases where the interference is greatest.

The normal rate-time production curve for a solution-gas-drive reservoir producing unrestricted is hyperbolic and may be represented by a straight line on log-graph paper. If the curve departs from the straight line and tends to parallel the time axis, this may be due either to the presence of some natural water drive or to expansion of the supporting area into an undeveloped portion of the reservoir. Whatever pattern the decline takes, the curve can still be used as an indicator of interference.

Many prefer the rate-cumulative curve because of the direct reading of cumulative barrels instead of years. In the case of wells approaching the economic limit, the rate-cumulative curve declines more sharply than does the rate-time curve and more clearly emphasizes the small future recovery expected from such wells.

Promising opportunity.—The most promising opportunity for acquiring direct field evidence arises from the drilling of additional wells in a reservoir which has already established a decline trend. This situation of new wells in old reservoirs has resulted from: (a) removal of the wartime 40-acre spacing rule; (b) increase in the price of crude oil; and (c) desire to increase current producing rate.

Examples usually represent the drilling of good wells and their interference effect on poor wells. Poor early wells constitute the usual reason why the field has continued incompletely developed. The fact that the early wells were edge wells with low initial potentials failed to encourage operators to further development until more favorable price conditions arose. Thus the usual situation is the drilling of late wells between less productive edge wells and the more productive part of the reservoir. If the discovery well had penetrated the most productive section, it is probable that no delayed-drilling example would appear.

As might be expected, pool-production curves indicate that the drilling of additional wells, centrally located, will usually result in greater ultimate recovery from the reservoir than would have been obtained from the early edge wells by themselves.

Five fields are used as sources of production-interference examples. In each case a well has established a decline trend over a period of years. This decline pattern is represented by a rate-time curve and a rate-cumulative curve. Following the several years of established decline, additional wells were drilled. An interference effect is shown by an abrupt break downward in the decline curve of the well under observation. Any prediction of future ultimate recovery based on the former established decline curve is now of no value. It is necessary to substantially reduce the ex-

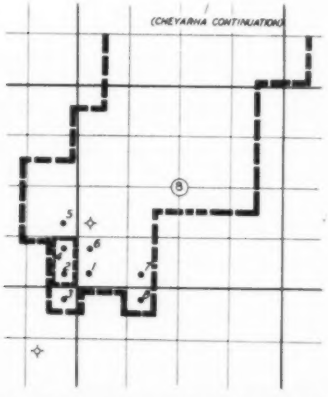


Fig. 7—Cheyarha pool: Early development status.

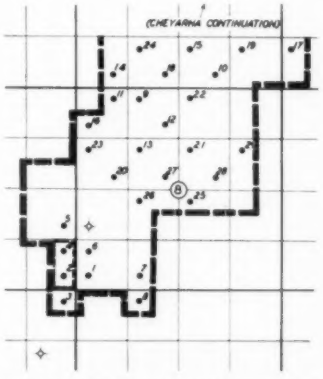


Fig. 8—Cheyarha pool: Development status before remaining 1,800-ft. interval was filled in.

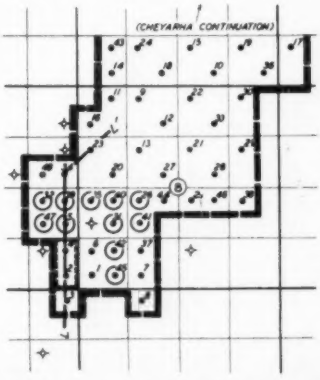


Fig. 9—Cheyarha pool: Complete development, 1946.

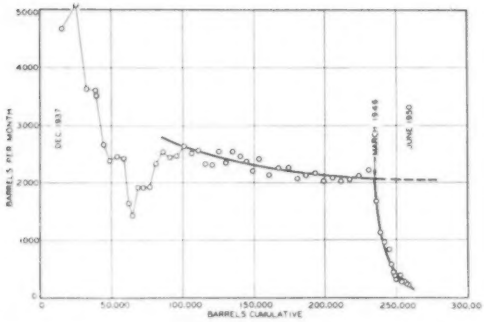


Fig. 10—Cheyarha pool: Wells Nos. 2-4, production (rate-cumulative): interference from late wells.

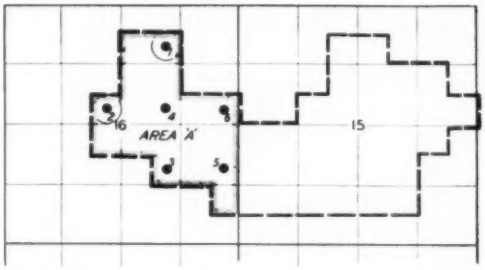


Fig. 13—Millay pool: Well No. 1, production (Rate-time) (log-log): interference from late wells.

pected future recovery from the well in conformance with the new decline curve. This reduction represents the interception and diversion of oil. Oil that had established a flow pattern toward the old well is intercepted and diverted from the old well to be produced by the new wells.

MARCH BARTLESVILLE SANDSTONE POOL

Depth, 3,600 ft.; thickness, 15 ft.; Townships 17n and 18n, Range 5e, Payne County, Oklahoma.

Fig. 1 shows the development status as it remained during the 5 years 1943-48. The discovery well, No. 1, was completed in June 1928, for 50 bbl. per day. About 1 year later, the east and northeast 10-acre offsets were completed for 78 and 80 bbl. per day, respectively. Wells Nos. 4 and 5 were completed in 1943 on 40-acre spacing, and there was then no further development for 5 years.

No. 4 (circled in Figs. 1 and 2) remained as a one-well lease throughout, and it is possible to observe the effect on it of increasing the well density in the pool. In October 1948, the south 10-acre offset to No. 4 was completed (No. 6 well) and in November of that year the southeast 10-acre offset was completed (No. 7 well). These two wells produced 2,400 bbl. per month during the last quarter of 1948. No more wells were completed for 1 year.

Fig. 2 shows the filled-in 10-acre spacing development as of April 1950. Fig. 3 shows the resulting interference with the production of No. 4 well. The first quarterly point in 1949 begins a steep departure from the previous flat decline, as a result of the completion of wells Nos. 6 and 7. The magnitude of the interference is reflected in the following production rates. During 1949, immediately following the completion of wells Nos. 6 and 7, the production of No. 4 well declined from 800 bbl. per month to 300 bbl. per month. On the old decline trend during 1949, there would have been a decline of 40 rather than 500 bbl. per month. A month-by-month comparison is given in Table 1.

GRAYSON CROMWELL SANDSTONE POOL

Depth, 3,000 ft.; thickness, 20 ft.; Township 6n, Range 6e, Seminole County, Oklahoma.

In April and May 1945, the first two wells were completed as diagonal 10-acre offsets (Fig. 4). There was no further completion until May 1947. Monthly runs have been separately recorded for No. 1 well (circled in Figs. 4 and 5), and it is possible to observe the effect on that well of additional drilling.

Eight additional wells in the latter part of 1947 brought the total to 10 on 10-acre spacing (Fig. 5). Fig. 6 shows how the later wells interfered with the production of No. 1 well. The production of No. 1 well was apparently not affected by the completion of No. 3 well in May 1947, inasmuch as No. 1 continued the same decline trend until September.

No. 4 well, direct north 10-acre offset, was completed in August 1947, but produced only 155 bbl. that month. In September, No. 4 well produced 1,650 bbl. and 3,751 bbl. in October. These figures for No. 4 directly correlate with a drop of 1,000 bbl. per month in the production of No. 1 well between September and October 1947. In 15 months, to the end of 1948, production declined from 3,000 bbl. per month to 400 bbl. per month. On the old trend, without interference, the decline would have been 600 instead of 2,600 bbl. per month. September and October also saw the completion of wells Nos. 5, 6, 7, 8, and 9, all farther from No. 1 than 40-acre spacing distance.

TABLE 1

Well—	1948 July	Aug.	Sept.	Oct.	Nov.	Dec.	1949 Jan.	Feb.	Mar.	Apr.	May	June
No. 4 (quarterly average)		858			828			611			526	
No. 4	930	744	900	744	840	899	538	532	744	720	527	330
Nos. 1, 5	713	650										
Nos. 1, 5, 6			1,560									
Nos. 1, 5, 6, 7				3,007	3,090	3,162	2,449	2,380	2,666	2,460	2,046	2,130

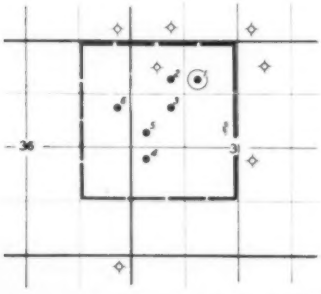


Fig. 11—West Agra pool: Complete development, December 1948.

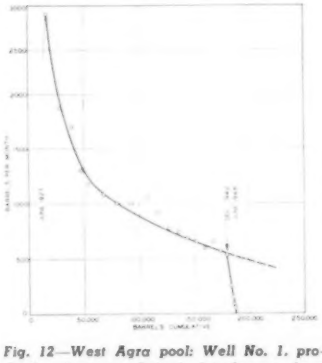
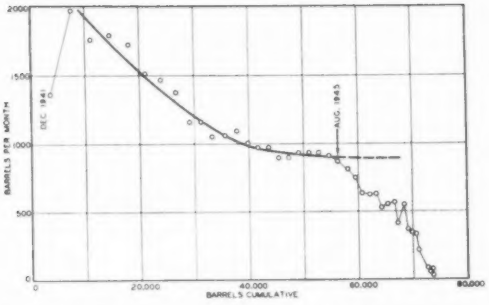


Fig. 12—West Agra pool: Well No. 1, production (rate-cumulative): interference from late wells.



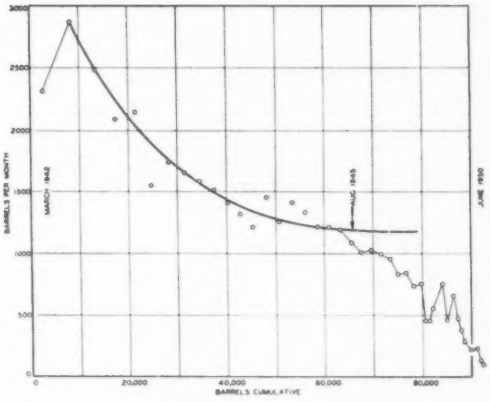


Fig. 14—(Above) Milfay pool: Well No. 1, production (rate-cumulative); interference from late wells. Fig. 15—(Right) Milfay pool: Well No. 2, production (rate-cumulative): interference from late wells.

CHEYARHA BOOCH SANDSTONE POOL

Depth, 3,600 ft.; thickness, 28 ft.; Townships 9n and 10n, Range 7e, Seminole County, Oklahoma.

Fig. 7 shows the early Booch development in an area which was then included in East Seminole. No. 1 well discovered the Booch reservoir in July 1937; by November 1938, eight wells had been completed.

In January 1944 the Cheyarha discovery well was completed 3 miles northeast of the East Seminole area. By January 1946, the Cheyarha development had extended southwest on 20-acre spacing to 1,800 ft. from the older group of wells. See Fig. 8. (Beginning April 1946 the older group was included under the name Cheyarha.)

Lease 2-4, outlined by a heavy dashed line in Figs. 7, 8, and 9, is selected as an indicator of interference. After January 1946 the undeveloped interval was filled in by 12 wells on 10-acre spacing (Fig. 9). Lease 2-4 had established a 5-year decline trend during 1941-45. The low rate of decline apparently reflected a large area of drainage. The filling in of the interval to the northeast, beginning in January 1946, immediately changed the decline as seen in Fig. 10. The new steep decline dropped the lease production in 2 years from 2,000 bbl. per month to 250 bbl. per month. The same 2 years, without interference, would have seen a very slight decline of 50 instead of 1,750 bbl. per month.

WEST AGRA CLEVELAND SANDSTONE POOL

Depth, 3,100 ft.; thickness, 8 ft.; Township 17n, Ranges 3e and 4e, Lincoln County, Oklahoma.

The discovery well of this pool produced alone for 15 years from 1927 to 1942. For the last 11 years production had followed a straight line log-log decline.

The second well was a west 10-acre offset (Fig. 11) and was completed in September 1942. The interference effect on the production of No. 1 well (circled in Fig. 11) is shown in Fig. 12. Interference of the second well reduced No. 1 from 600 bbl. per month to 200 bbl. per month. On the old trend, without interference, the decline would have been only 100 instead of 400 bbl. per month. The same steepened-decline trend continued as No. 3 and later wells were completed. Comparison of half-year averages, barrels per month, provides a measure of the interference in barrels of production and are shown in Table 2.

TABLE 2

	1941		1942		1943	
	First half	Second half	First half	Second half	First half	Second half
No. 1 well	570	567	488	567	317	180
No. 2 well				867	1,179	1,189

MILFAY WILCOX SANDSTONE POOL

Depth, 3,900 ft.; thickness, 94 ft. (reduced by oil-water contact); Township 15n, Range 7e, Creek County, Oklahoma.

The west area of this pool was first developed by six wells on 40-acre spacing. The first two wells were completed in 1941-42 and the other four in 1944-46. Wells Nos. 1 and 2 are circled in Fig. 13. The production curve of No. 1 well is drawn in Fig. 14. The production curve of No. 2 well is drawn in Fig. 15. These production curves show the interference from wells Nos. 3, 4, 5, and 6. No. 4 is the nearest well, one 40-acre location distant, and the interference effect begins with the completion of No. 4.

During the 16 months to the end of 1946, production of No. 1 well declined from 900 bbl. per month to 500 bbl. per month. On the old trend, the decline would have been 10 instead of 400 bbl. per month. During the 18 months to the end of 1946 production of No. 2 well declined from 1,200 bbl. per month to 700 bbl. per month. On the old trend, the decline would have been 50 instead of 500 bbl. per month.

Summary and conclusions. — The five examples illustrate definite production interference between wells at distances ranging from 660 to 1,400 ft. It is concluded that in these examples wells were spaced closer than necessary from the standpoint of ultimate recovery of oil from the pool. This is to say that wells need not have been drilled as close as 10-acre spacing, or even as close as 40-acre spacing.

The interference has resulted from the interception and diversion of oil, to late wells from an established movement to early wells. In all cases, the early wells were edge wells and the late wells were drilled between the early wells and the more productive portion of the reservoir. In each of these instances, the pool would not have recovered as much oil from the early wells alone as with the drilling of the additional wells.

BOOKS

ADVANCED WRITING. By Robert L. Zetler and W. George Crouch. Published by Ronald Press Co., 15 East Twenty-Sixth Street, New York. 270 pp. $3.25.

In this volume the authors assume that the reader has already gained control over English grammar and punctuation, and concentrate attention on the techniques of expression, on the art which lies hidden within the words of any piece of creative writing. While intended primarily for the student, the authors have included examples of professional writing, with the suggestion that the student might begin by imitating successful writers, but that in the end should cultivate his own talent. The book is divided into eight chapters, covering the writer's equipment, exposition, paragraph patterns, description, narration, plot techniques, and the narrative sketch. Arrangement is thus progressive, taking the reader from the simple types of personal exposition to the more complex forms of description and narration.

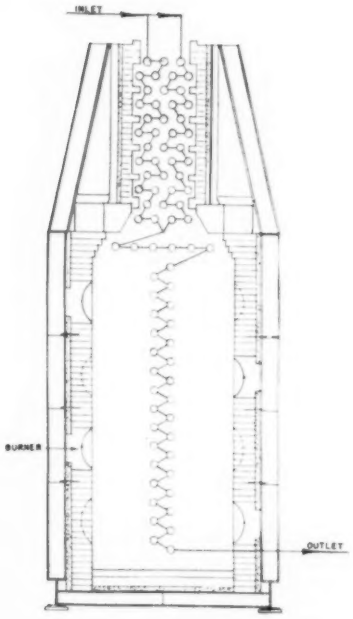
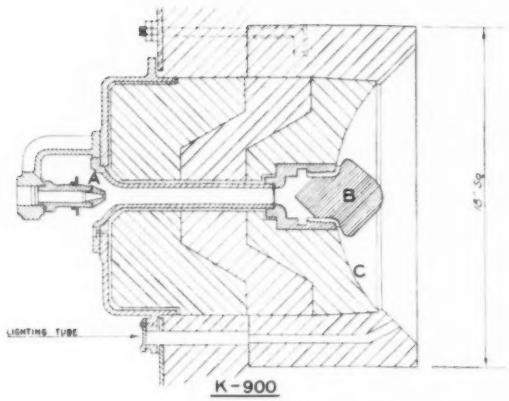


Fig. 1—Radiant furnace cross-section.



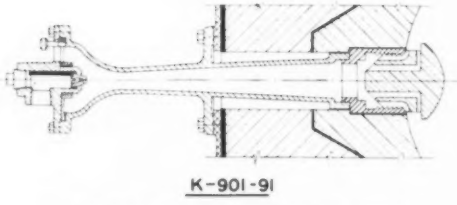


Fig. 2—Cross-section of radiant-type burners.

A New Development in RADIANT HEATING For the Petroleum Industry

by C. C. Tate*

THE selection and operation of heaters has always been a major consideration for the refiner. The refining industry is continually looking for a more effective and cheaper means of satisfying the heater requirement for both old and new processes. It is believed all agree that through the development of refining methods more time, effort, and money have been spent on heaters than on any other one part of the integrated equipment that goes to make up a refinery.

As a part of our continuing research, two separate investigations developed information which resulted in the commercial application of a new type of radiant-heat source for petroleum processing.

The first investigation consisted of an extensive series of semicommercial tests to determine the best thermal method of cracking a catalytic cycle oil, in order to produce a low-aniline-number gas oil. Tests included single-pass, two-pass, and recycle cracking, at varying temperatures and pressures.

The second test program resulted from a study of the various catalytic feed-preparation methods for the Borger refinery, which indicated probable production of a high-viscosity paraffinic vacuum residuum, amounting to approximately 12 liquid volume per cent of the crude and representing a large volume of low-value product when cut back to fuel-oil-viscosity specifications. Pilot-plant tests indicated that for high-destruction gas-oil cracking and for visbreaking vacuum residuum a radiant heater designed for short residence time, uniform heat transfer, and some control of the shape of the heating curve was required.

About this time two articles were published—one by J. H. Rickerman[1] and another by L. A. Meckler[2]—both of which mentioned that a flameless ceramic cup burner had been developed as a radiant-heat source for refinery heaters, allowing any desired shape of the time-temperature heating curve of the oil. As a result, a demonstration of the ceramic cup burners was witnessed and, subsequently, a thirty-million-B.t.u. heater was purchased for the Borger refinery.

Description of Furnace and Burners

The new heater was shipped in two sections, namely radiant and convection, and was installed in a very short time and minimum cost. The heater is constructed with the radiant coil placed midway between the sides as shown in Fig. 1. The radiant section is 38 ft. 6 in. long, 5 ft. wide, and 12 ft. high (inside dimensions). The convection section is 38 ft. 6 in. long, 2 ft. 3 in. wide, and 6 ft. 7½ in. high. Total ground area covered is 860 sq. ft.

Oil enters the heater at the top and splits into two parallel streams

*Manager, refining department, Phillips Petroleum Co. Presented at thirty-ninth annual meeting of W.P.R.A., San Antonio, April 1951.

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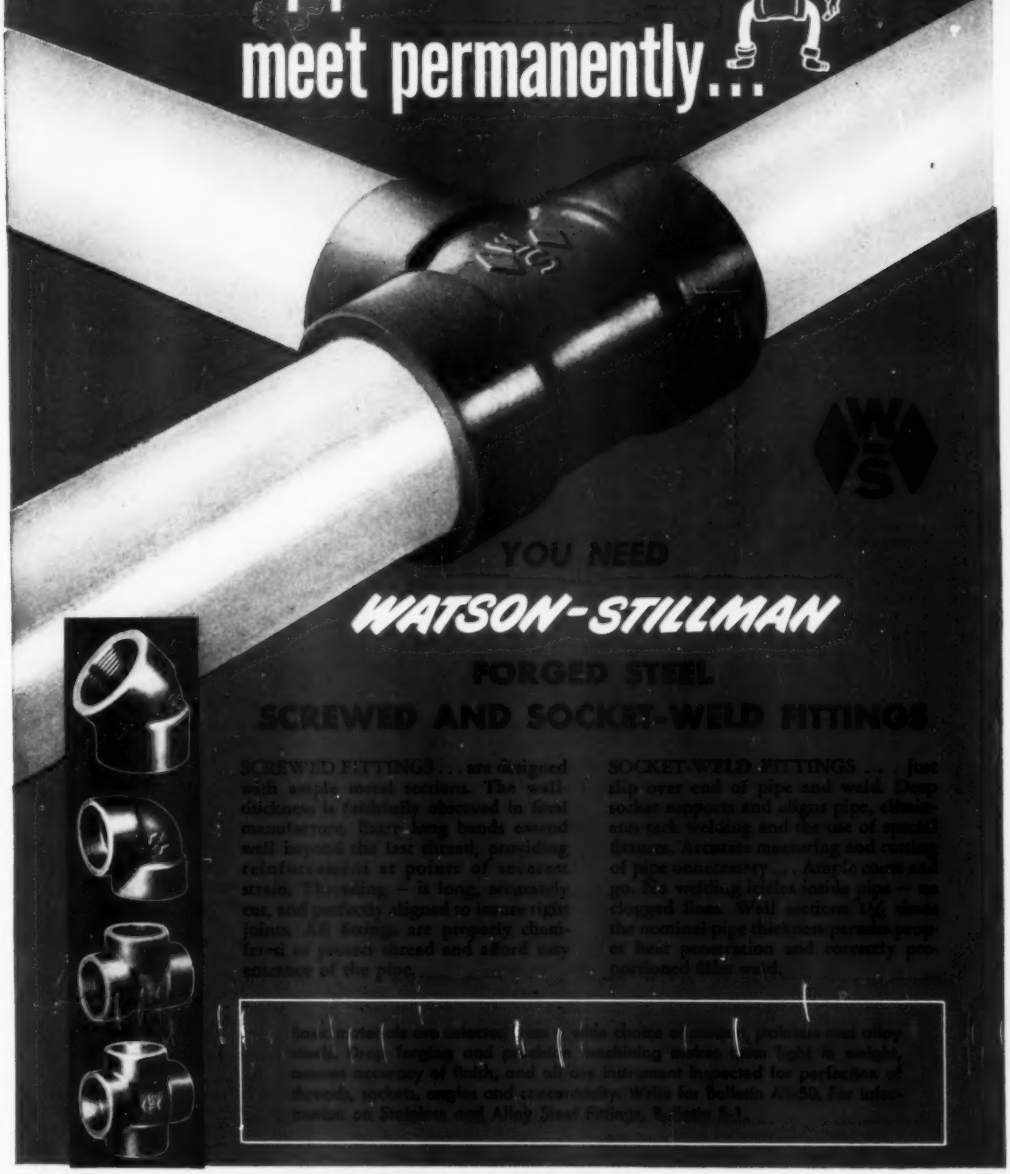

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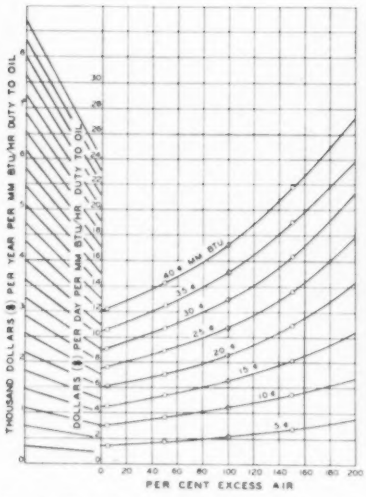
THOUSAND DOLLARS ($) PER YEAR PER MM BTU/HR DUTY TO OIL
DOLLARS ($) PER DAY PER MM BTU/HR DUTY TO OIL
40 ¢ MM BTU
35 ¢
30 ¢
25 ¢
20 ¢
15 ¢
10 ¢
5 ¢
0
0 20 40 60 80 100 120 140 160 180 200
PER CENT EXCESS AIR

Fig. 3—Effect of excess air on fuel cost for a specific furnace.

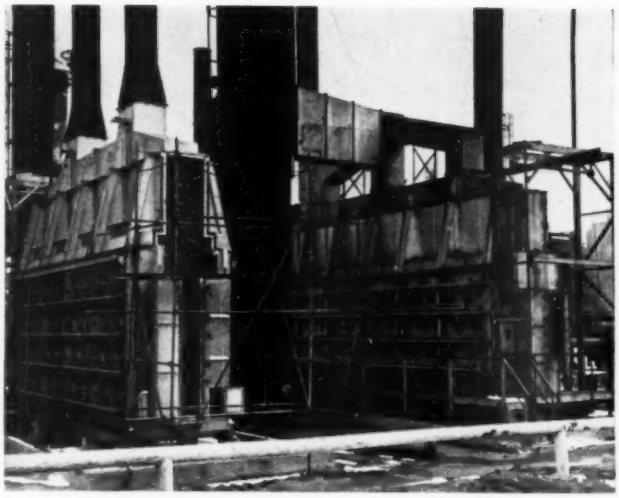

Fig. 4—Two of the radiant heaters installed at the Borger, Tex., refinery of Phillips Petroleum Co.

which pass through a 42-tube convection section countercurrent to the flue gases. Convection tubes are on equilateral triangular spacing and the rows are alternately three and four tubes wide. After leaving the convection section, the streams are joined and pass through a six-tube shock section and then pass down into the radiant section. The 31-tube radiant section consists of two rows of tubes staggered so that the oil travels a zigzag path down to the outlet at the bottom of the heater. All tubes are 3½-in. o.d. by ½-in. wall. The convection tubes are 7 per cent chrome while the radiant tubes are 9 per cent chrome. Welded return bends are used throughout.

Fifty-six ceramic burners are mounted in each wall—each burner independently controlled, each cup projecting heat uniformly over an area overlapping the areas serviced by the adjacent burners. The type of burner as shown in the top of Fig. 2 is rated at 375,000 B.t.u. per hour with a spud pressure of 6.2 psi. The gas is premixed with air by means of an air blower and an Askania ratio controller. This air-gas mixture is approximately 225 B.t.u. per cu. ft. when it issues from a spud at the entrance of the burner and entrains sufficient additional air to dilute the mixture to 100 B.t.u. per cu. ft.

This 100-B.t.u. gas is thoroughly mixed and passes through 24 grooves around the ceramic tip of the burner. The 24 grooves issue radially into a ceramic cup. The cup is so shaped that the numerous small flames wipe the inner surface of the refractory plate and heat it to incandescence, at a reported temperature of 2,400° F. As a result of this high cup temperature and intimate mixing, optimum conditions for complete combustion exists.

TABLE 1—RADIANT HEATER TEST

	Top (°F.)	Bottom (°F.)
Firebox temperature:		
Maximum	1,490	1,580
Minimum	1,390	1,575
Average	1,425	1,580
Stack gas temperature, °F.		712
Coil temperatures and pressures:		°F.
Inlet (790 psig.)		117
Inlet 21st north		507
Inlet 21st south		518
Inlet 27th		648
Inlet 35th		805
Inlet 39th		875
Inlet 45th		943
Outlet (500 psig.) 58th tube skin temp.		1,285
Charge (33.8° A.P.I.), bbl. per hour		121
Fuel fired (hydrogen-carbon ratio 3.46), cu. ft. per hour		39,400
Orsats—(mass spectrometer average of 14 samples):		
CO_2		10.85
CO		.20
O_2		2.05
N_2		86.90
Per cent excess air		9.2
Hydrogen-carbon ratio		3.66
Heat balances based on gas side:		
Heat released by flame	36.2 × 10⁶ B.t.u./hr.	
Heat pickup by oil in furnace	29.48 × 10⁶ B.t.u./hr.	
Over-all efficiency (L.H.V.)	81.5 per cent	
Heat pickup by oil in radiant box	2.22 × 10⁶ B.t.u./hr.	
Average radiant rate	17,000 B.t.u./hr./sq. ft.	
Per cent of useful heat	75.3 per cent	
Heat pickup by oil in convection bank	7.28 × 10⁶ B.t.u./hr.	
Average convection rate	4,920 B.t.u./hr./sq. ft. (o.d.)	
Per cent of useful heat	24.7 per cent	

The principal materials of the radiant cup burners are refractories. Material of the burner tip has to withstand a temperature difference over 2,000° F. from one end to the other. The material of the cup, being instantly and constantly in contact with the gas flame, must be of such quality as to be readily brought to incandescence, to produce the full effect of radiation shortly after combustion is started. These refractories have proved themselves durable and it is understood that tests are still being made to find a material which will withstand a temperature of 3,000° F. and higher.

Due to the simplified design and construction features, the various sections of the heater are especially accessible for maintenance work. Due to the fact that some idea of the coking limits had to be established for each charge stock, this furnace has on occasion been fired at extremely severe conditions. In spite of this, the original brickwork in both the radiant and convection sections is still in excellent condition, and no maintenance has as yet been necessary or is anticipated.

Heater Operation

Since start of operation every stillman who has had contact with the heater is pleased by the ease with which it handles in variable high-velocity winds prevalent in the Borger area; they have reversed their opinion that the smoothest heater is the one which fires with over 100 per cent excess air.

The operation of the heater has been followed closely and a typical

(Continued on page 138)

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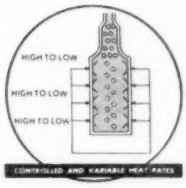

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THIN Oil-Column Completions in Louisiana-Mississippi Gulf Coast Area

by R. G. Loper

A PART of the great reserve that lies in the Louisiana and Mississippi Gulf Coast area would remain untapped except for the completion of wells in thin oil columns. A general definition of a thin oil column is an oil zone within a producing horizon and adjacent to gas and/or water without intervening impervious formations and of a thickness that will not permit a ready selective production of oil. Included here are descriptions of certain wells which were completed in such columns and the conclusions of the A.P.I. subcommittee appointed to study thin oil-column completions.

The well logs presented are typical examples which will be discussed separately. If centralizers and scratchers were used in the completion of a well, it will be indicated in the description of the completion. The original gas-oil and oil-water contacts are indicated if they were known. These contacts were picked from core analysis, electric logs, or from the original contacts in nearby wells.

It is not the intent of the author to disagree with certain completion practices or equipment, but to suggest a better method of completion in order to obtain more satisfactory results with the minimum amount of trouble.

Problem 1—Block Squeeze

This well was drilled to a total depth of 11,204 ft. and cemented with 1,000 sacks of cement. The casing was perforated from 11,152-57 ft. and squeezed with 75 sacks of cement with a maximum and final pressure of 5,000 psi. There was no production found at this depth and the well was plugged back to 10,080 ft. Ten ½-in. perforations were made at 10,058-62 ft. and a block squeeze was made with 190 sacks of cement with a final pressure of 4,200 psi.

Another block squeeze was made through the same number of perforations from 10,024-26 ft. This latter squeeze required three stages; the first with 170 sacks resulting in a final pressure of 2,500 psi., the second with 200 sacks with a final pressure of 1,000 psi., and the third with 195 sacks with a final pressure of 4,200 psi. The cement was then drilled out to 10,050 ft. and perforations were made for production from 10,040-45 ft. with eight ½-in. holes per foot.

A perforated nipple was set below a hookwall packer and the completion gage was 210 bbl. of 40.6° -A.P.I. gravity oil per day with no show of water and a gas-oil ratio of 1,094 to 1.

R. G. Loper, assistant professor of petroleum engineering at Louisiana State University, Baton Rouge, is a native of Cleveland. He received his B.S. and M.S. degrees from University of Oklahoma, where he also served as instructor. He served as a captain in the U. S. Army Field Artillery in World War II. During the summer months Loper worked for various oil companies. The accompanying paper was presented at the spring meeting of the Southwestern District, American Petroleum Institute's Division of Production, in Beaumont, March 7-9.

Later Reworked for High Gas-Oil Ratio

The well was reworked after producing a total of 71,136 bbl. of oil because of an excessive gas-oil ratio and mechanical trouble. The perforations were squeezed with 73 sacks of cement with a final pressure on the squeeze of 4,800 psi. The cement was again drilled out to a depth of 10,050 ft. and the well was perforated for production from 10,047-49 ft. with four ½-in. holes per foot. The well was completed in February making 204 bbl. of pipe-line oil per day, with a gas-oil ratio of 967 to 1.

By September of the same year the production had dropped to 97 bbl. per day and 5 per cent water, with a gas-oil ratio of 11,296 to 1. The perforations from 10,047-49 ft. were squeezed with 105 sacks of cement with the squeeze pressure building up to a maximum and final pressure of 4,500 psi. The casing was perforated from 10,049-52 ft. with 10 holes resulting in a production of 178 bbl. of pipe-line oil per day, with a gas-oil ratio of 761 to 1. The gravity of the crude was 42.2° A.P.I. corrected. After 1-month's production the gas-oil ratio increased to 4,013 to 1 with no show of water. The cumulative production from this well for a 2½-year period was 179,404 bbl.

This is a good example of the proper technique to be followed in the event that the casing was not equipped with centralizers and scratchers. However, the squeeze above the gas-oil contact is entirely too high to serve the purpose of shutting off the gas. The procedure followed in perforating successively lower in the hole could result in continued high gas-oil ratios because the old production perforations may not be completely sealed as will be shown later herein.

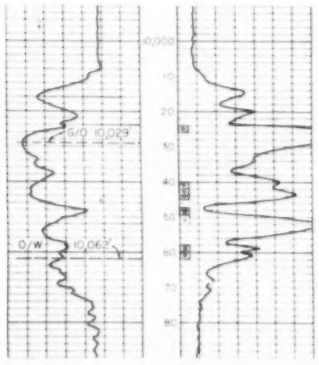
Problem 2—A Channeled Cement Job

Perforations were made for a squeeze from 9,425-9,430 ft. with ten ½-in. holes. Mechanical troubles developed after a total of 35 sacks of cement had been squeezed into the formation under a pressure of 1,900 psi. Perforations were again made at the same depth and the squeeze was made in six stages.

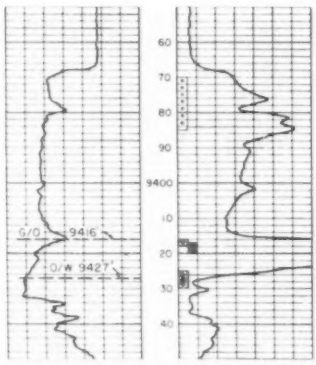
The first was with 100 sacks with a final pressure of 350 psi.; the second, third, fourth, and fifth were with 150 sacks with pressures of 1,600, 200, 1,200, and 1,300 psi. respectively; and the sixth was with 110 sacks with a final pressure of 5,800 psi. The section from 9,416-18 ft. was perforated and squeezed with 90 sacks with a final pressure of 5,600 psi.

Three feet were perforated with twenty-four ½-in. holes from 9,417-20 ft. and tested for production. The well flowed at the rate of 80 bbl. of pipe-line oil per day with a gas-oil ratio of 923 to 1. After 4 years the well had produced a total of 47,555 bbl. of oil, at which time the water cut had increased to 65 per cent and the gas-oil ratio had increased to 10,667 to 1.

The well was reworked to make a gas well because of the high gas-oil ratio, water, and a ready market for the gas. After squeezing the production perforations with 150 sacks of cement to a pressure of 4,400 psi., 15 ft. of gas sand were perforated with six shots per foot from 9,370-85 ft. The well was tested and shut in for 2 months at which time the gage was 190 bbl. per



Problem 1—Block squeeze.



Problem 2—Channeled cement job.

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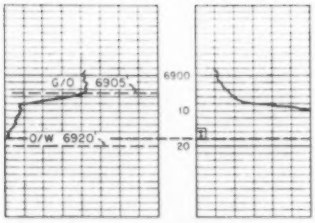


Problem 3—Minimum completion distance above oil-water contact.

day at a gas-oil ratio of 16,947 to 1 with no water.

The total production from the well in 5 years was 57,037 bbl. of distillate.

The lower section was depleted as indicated by the increased water production before the workover.

Problem 3—Minimum Completion Distance Above Oil-Water Contact

Centralizers and scratchers were used in completing this well at a depth of 6,918 ft. The temperature survey found the top of the cement at 5,874 ft. while the calculated height with 260 sacks of cement indicated the cement should have been found at a depth of 6,289 ft. Perforations for plastic squeeze and production were made from 6,915-18 ft. with 12 holes per foot. The plastic consolidation was made in two stages using 100 gal. of plastics for each stage. Both stages required 2,500 psi. to squeeze the plastic into the formation. The well was completed using a hookwall packer. The completion gage was 163 bbl. of pipe-line oil per day with a gas-oil ratio of 853 to 1.

Two months later the well bridged with plastic and sand necessitating a workover. The same producing perforations were squeezed with 200 gal. of mud acid which was followed by a two-stage plastic squeeze. Again 100 gal. for each stage was used with final squeeze pressures of 1,350 psi. for the first stage and 1,150 psi. for the second stage.

The same type of production completion was made and the completion gage indicated 130 bbl. of oil per day, with 1/10 per cent b.s.&w. and a gas-oil ratio of 1,120 to 1. Approximately 1 year later the individual gage was 205 bbl. of pipe-line oil per day, with a gas-oil ratio of 590 to 1. In all the tests the gravity of the oil remained at approximately 41° A.P.I. corrected.

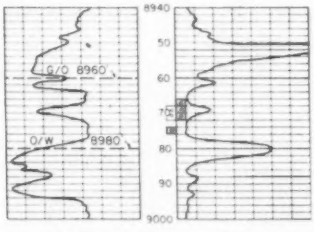
The total production at the last gage was 109,736 bbl. with no appreciable water production even though the producing perforations were only 2 ft. above the oil-water contact. The gas-oil ratio remained low as a result of perforating in the lower part of the producing sand. This completion gives some indication as to the minimum distance above the water that a well may be completed, and also indicates the advantage of using centralizers and scratchers to eliminate blocks squeezes to insure a good cement job.

Problem 4—Gas Channeling

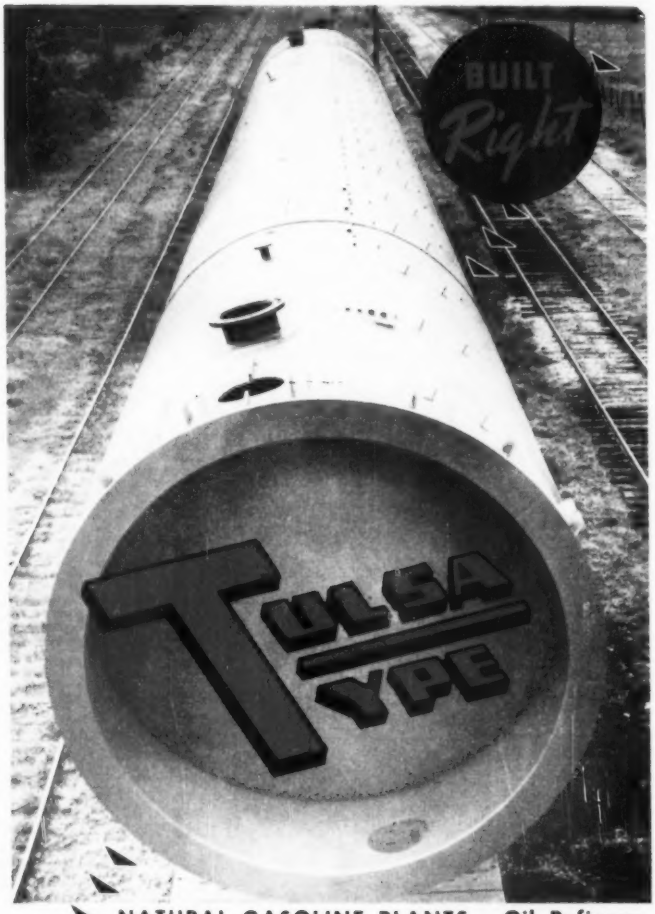
This well was cemented without centralizers and scratchers at a depth of 9,707 ft. with 1,000 sacks of cement. The casing was perforated from 8,974-76 ft. with ten ½-in. holes for a block squeeze. Two hundred seventy-five sacks were squeezed with a final pressure of 4,500 psi. Perforations for test were made with forty-eight ½-in. shots in the section from 8,966-72 ft. The resulting drill-stem test was 185 bbl. of oil per day with 1/10 per cent b.s.&w., and at a gas oil ratio of 577 to 1.

A hookwall-packer setting was made and when tested made gas with a small amount of distillate. These perforations were squeezed in three stages with 150 sacks of cement being used for each stage. The pressures recorded for the first two stages were 2,600 psi., and 5,000 psi. for the last stage. A completion gage was then made after perforating from 8,968-72 ft. with eleven ½-in. holes. The gage was 271 bbl. per day through a ⅛-in. choke with 1/10 per cent b.s.&w. and a gas-oil ratio of 453 to 1. The gravity of the crude was 36.6° A.P.I. corrected.

The last individual gage taken 3



Problem 4—Gas channeling.



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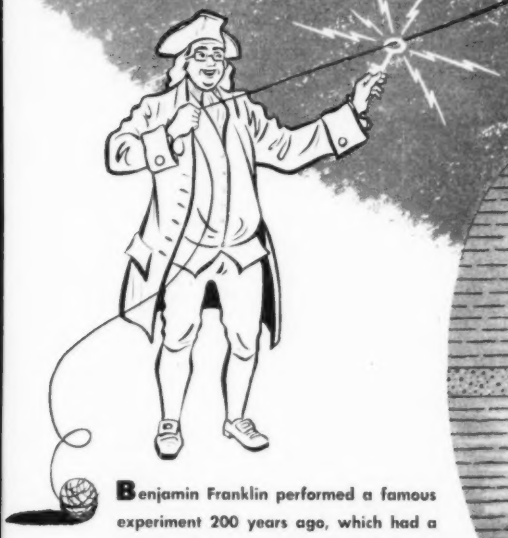

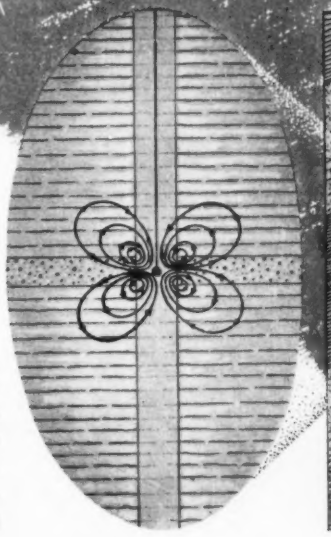

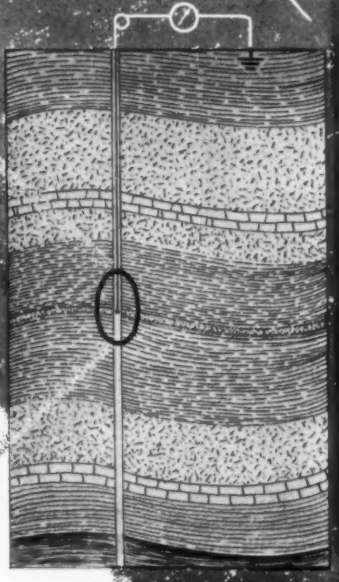

Benjamin Franklin performed a famous experiment 200 years ago, which had a counterpart in the investigations of ground potentials carried on much later by the Schlumbergers. Franklin proved the existence of positive and negative electrical charges by flying a kite in a rainstorm.

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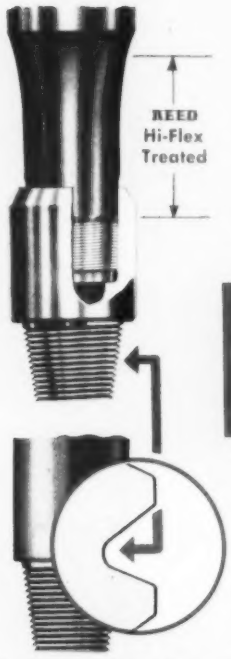

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years later was 99 bbl. per day with 10 per cent b.s.&w. and an increase in gas-oil ratio to 9,545 to 1. Cumulative production for the 3-year period was 85,837 bbl. of oil.

From the test records, it is indicated that on the first completion there was a channel at the shale break and gas was coming from above.

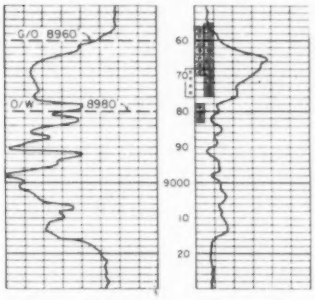
Problem 5—Failure to Recognize Gas-Oil Contact

Perforations were made from 8,978-83 ft. with two holes per foot for a squeeze to insure the shutoff of bottom water. The squeeze was completed with 490 sacks of cement being pumped into the formation with a final pressure of 3,600 psi. A drill-stem test of perforations from 8,956-70 ft. with fifty-six ½-in. holes yielded 82 bbl. of pipe-line oil with a gas-oil ratio of 16,750 to 1.

The perforations were squeezed with 590 sacks of cement and the final and maximum pressure was 5,200 psi. The third perforations were made from 8,955-76 ft. with two ½-in. holes per foot and squeezed at 5,100 psi. with 560 sacks of cement. The next set of perforations for production were made from 8,968-76 ft. with four ½-in. holes per foot and tested 86 bbl. of pipe-line oil per day with a gas-oil ratio of 2,541 to 1.

After completion, the gage was 119 bbl. per day with 1/10 per cent water and a gas-oil ratio of 2,500 to 1. After producing for 8 years, the gage was 109 bbl. per day with 55 per cent b.s.&w. and the gas-oil ratio had decreased from 2,500 to 1 to 843 to 1. The cumulative production for the period indicated was 350,101 bbl. of 39° A.P.I. oil.

The first perforations for test were made well into the shale and gas cap as indicated by the log and the high gas-oil ratio.

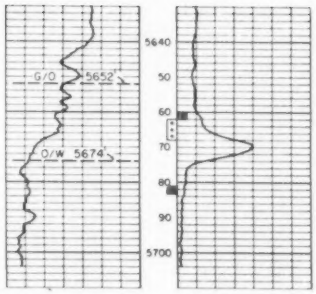


Problem 5—Failure to recognize gas-oil contact.

Problem 6—Use of Plastic Opposite Transition Zone

After deepening and setting liner perforations were made from 5,681-83 ft. for a two-stage squeeze. The formation was broken down with a pressure of 2,000 psi. before squeezing 210 gal. of resin cement with a maximum pressure of 2,000 psi. and a final pressure of 1,750 psi.

The second stage was squeezed with the same amount of cement but the breakdown pressure was 1,200 psi., the maximum pressure was 2,150 psi. and the final pressure was 1,200 psi. The second stage was tested at a pressure of 1,500 psi. before perforating for a squeeze from 5,660-62 ft. The first two stages were each squeezed with 310 gal. of resin cement.



Problem 6—Use of plastic opposite transition zone.

The first stage had breakdown, maximum, and final pressures of 1,200, 1,400, and 1,200 psi. respectively. The second-stage pressures were 1,300 psi. breakdown, and a maximum and final pressure of 1,600 psi. The third stage was squeezed with 95 sacks of slow-set cement with a breakdown pressure of 1,200 psi. and the maximum and final pressure was 2,000 psi.

Stage four was squeezed with 95 sacks of 2 per cent bentonite cement with breakdown, maximum, and final pressures of 1,400, 2,200, and 2,000 psi. Production perforations were made from 5,662-68 ft. with six ½-in. holes per foot. Production from these perforations was 67 bbl. per day with 44 per cent wash water at a producing gas-

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oil ratio of 1,970 to 1. The well sanded up 9 months later at which time the packer and tubing were pulled and reset.

At the end of the first day after being placed on production the well had sanded up. The production perforations were squeezed with permeable plastic using 125 gal. for the first stages and 150 gal. for the third. The first stage had a maximum pressure of 750 psi. and final of 0 psi. The second stage reached a final pressure of 250 psi. After breaking down the formation with 700 psi., the last stage was squeezed with a maximum pressure of 800 psi. and a final pressure of 400 psi. On testing the well would not flow. It then swabbed 20 to 30 per cent sand. Another 150 gal. of plastic were squeezed into the formation, requiring a maximum pressure of 800 psi. and a final pressure of 250 psi.

The tubing with gas-lift valves was reset with a hookwall packer. The well came in making 98 per cent water but within 5 days had cleaned itself and was producing at the rate of 49 bbl. of oil per day with no water or sand. Within a month's time the well had again sanded up. After cleaning out, thirty-two ½-in. holes were shot from 5,662-68 ft. for a gravel pack. The pack was made in the following order: First, eight sacks of fine gravel were squeezed into the formation; second, ⅛ sack of 0.187 to 0.250 coarse gravel and 7¾ sacks of 0.04 to 0.06 fine gravel were squeezed out; and, third, 9¼ sacks of fine gravel were squeezed through the perforations. During the gravel pack the maximum pressure recorded was 1,500 psi. and the final pressure was 400 psi. The gage upon completion was 16 bbl. per day on gas lift with 50 per cent water.

The last individual well gage, made 7 months after the last workover, was 120 bbl. of 37.2° A.P.I. oil flowing with a gas-oil ratio of 900 to 1. The cumulative production to this date was 39,100 bbl. of oil.

The failure of the consolidating plastic would certainly have been expected, since most of the perforated interval was opposite the sand-shale transition zone.

Problem 7—Perforated at Gas-Oil Contact

Production was obtained from lower sands before plugging back to the present zone. Two feet were perforated with 10 holes from 10,058-60 ft. and squeezed with 90 sacks of cement at a maximum and final pressure of 5,000 psi., after breaking down the formation with 3,800 psi. Test perforations were made at a density of four holes per foot from 10,020-32 ft. and tested gas and distillate.

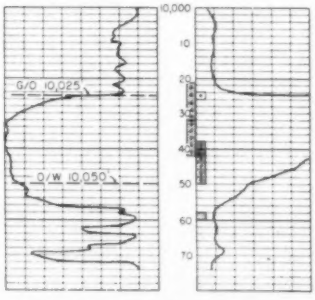
Perforations were again made without a squeeze from 10,032-42 ft. with the same perforation density. Production from these perforations was 248 bbl. of pipe-line oil per day with a gas-oil ratio of 1,150 to 1. The gage, after completing, was 105 bbl. of oil per day with 50 per cent water and a gas-oil ratio of 20,604 to 1.

Due to the high gas-oil ratio the perforations were squeezed with 35 sacks of cement at a maximum and final pressure of 2,200 psi. The cement was drilled out to 10,034 ft. and squeezed with 250 gal. of nonpermeable plastic. The breakdown pressure was 2,900 psi., the maximum 3,500 psi. and the final 2,900 psi. The plastic squeeze was repeated after drilling out to 10,034 ft. with 250 gal. after breaking down the formation with 2,900 psi. and building up to a maximum and final pressure of 3,500 psi.

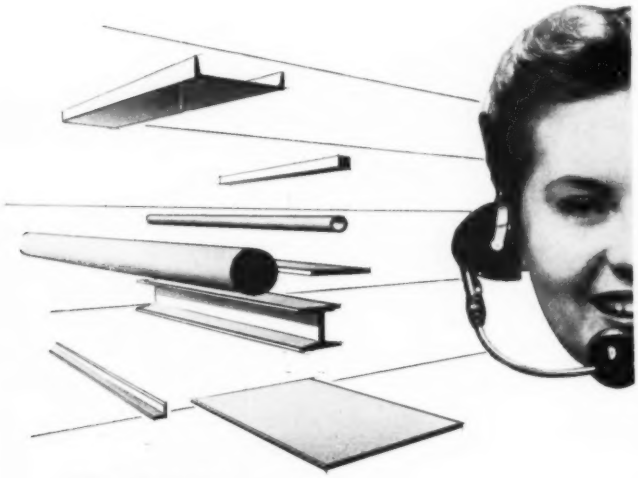
The plastic was drilled out and production perforations made from 10,038-42 ft. with 48 holes. A drill-stem test indicated 122 bbl. per day with 1/10 per cent b.s.&w. and a gas-oil ratio of 4,390 to 1. The casing was cleaned out to 10,051 ft. and perforated from 10,038-50 ft. with six holes per foot. The test from the last perforations was 225 bbl. per day with 1/10 per cent water and the gas-oil ratio was reduced to 1,870 to 1. A screen setting was made and the completion gage was 194 bbl. per day with 5 per cent cut and a gas-oil ratio of 4,983 to 1.

Production continued for a period of 3 years at which time the well went dead and was swabbed in but required the installation of flow valves before any more production was obtained. After 3 months on gas lift the production had dropped to 18 bbl. of oil and 890 bbl. of water per day. The production perforations were squeezed and the casing was perforated from 10,024-26 ft. The completion gage indicated 103 bbl. per day with 97 per cent b.s.&w. on gas lift. The cumulative production for 4 years was 149,509 bbl.

It is to be noted that these latter



Problem 7—Perforated at gas-oil contact.



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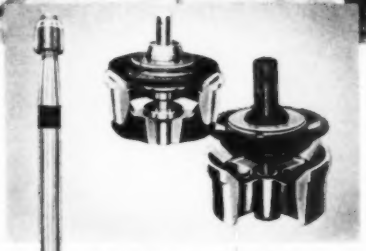

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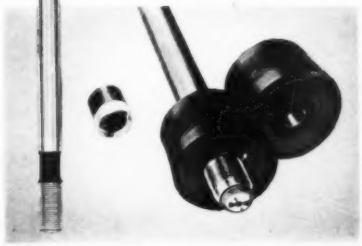

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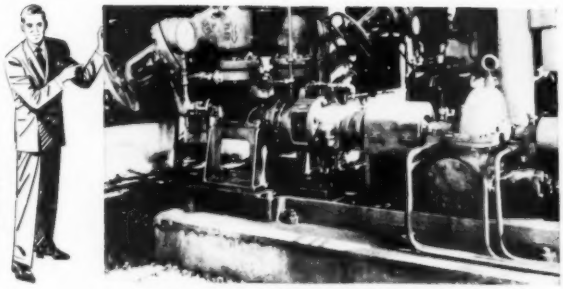

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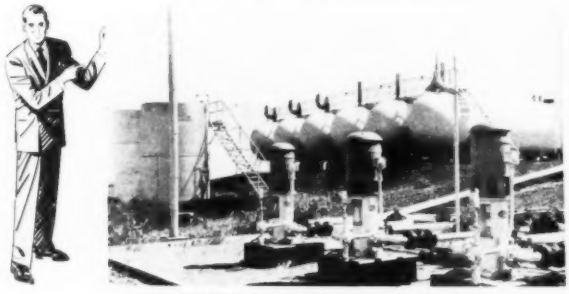

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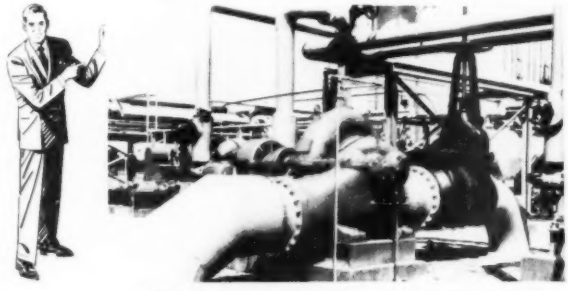

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perforations had tested gas in the early history of the well but on depletion of the lower zone gave a water cut of 97 per cent. This would have been expected due to the continued high gas-oil ratio during the production of the lower section. The well had an original gas-oil contact well above the perforations from 10,038-50 ft., but it was either indicated to be in error as a result of the tests or the contact from the core analysis was correct and the squeeze jobs were not successful.

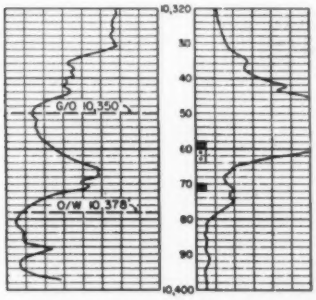
In either case, one more squeeze operation to reduce the gas-oil ratio would not have been excessive in view of the fact that there had been numerous squeezes in an attempt to complete the well. In any event, the well should never have been perforated at the gas-oil contact. The early production of water was to be expected since the lower perforations were made at the oil-water contact.

Problem 8—A Block-Squeeze Completion

Block squeezes were made both below and above the section selected for production. The lower squeeze was made through eight ½-in. perforations from 10,370-72 ft. with 50 sacks of cement which required 3,900 psi. to break down the formation and a final and maximum pressure of 5,200 psi. The upper squeeze was completed with 70 sacks of cement with a maximum and final pressure of 5,300 psi. in the section 10,358-60 ft. which was perforated with eight ½-in. holes.

The cement was drilled out to 10,370 ft. and the casing perforated from 10,360-64 ft. with six ½-in. holes per foot. The completion gage showed 246 bbl. of pipeline oil per day with a gas-oil ratio of 732 to 1. After producing for 20 months the well was still producing at a rate of 64 bbl. per day with a gas-oil ratio of 1,796 to 1, but the water production had increased to 80 per cent.

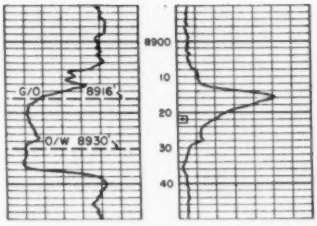
This is a good method of completion where high gas-oil and/or water-oil ratios are to be expected in thin oil-column completions.



Problem 8—A block squeeze completion.

Problem 9—Completion Through Original Perforated Section

This well was first perforated from 8,921-23 ft. with 12 holes and squeezed



Problem 9—Completion through original perforated section.

in four stages. The first stage required 2,200 psi. to break down the formation, and the 150 sacks of cement were squeezed with a maximum pressure of 3,200 psi.

On the second squeeze, the formation broke down with 2,200 psi. and 100 sacks were squeezed out with a maximum pressure of 4,800 psi. The next stage required a breakdown pressure of 4,100 psi. and a final pressure of 4,200 psi. to squeeze out 75 sacks.

The first three stages were followed with approximately 7 bbl. of water to clear the perforations. The fourth and final stage was made by mixing 100 sacks and squeezing out 90 sacks. The breakdown pressure was 5,500 psi. and the final pressure was 5,200 psi. Perforations were made in the same section with the same number of shots after drilling out the cement. The results of the test were 216 bbl. of oil per day with a gas-oil ratio of 1,138 to 1.

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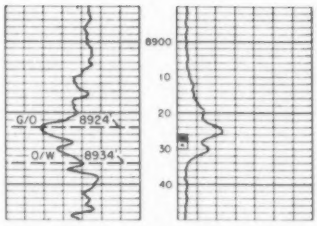
Problem 10—Minimum Completion Distance Below Gas-Oil Contact

Squeeze perforations were made from 8,926-28 ft. with six holes per foot. The formation was broken down at 1,600 psi. and 160 sacks of cement were squeezed with a maximum and final pressure of 5,000 psi. After drilling out the cement a neutron log was run for the purpose of picking the gas-oil contact which was indicated at 8,924 ft.

Perforations for production were made from 8,926-28 ft. and the well flowed 167 bbl. per day with 1/10 per cent cut and a gas-oil ratio of 3,444 to 1. Due to the high gas-oil ratio the well was killed and squeezed with 50 sacks of cement at a maximum and final pressure of 5,200 psi. The next perforations were made 2 ft. lower with 12 shots from 8,928-30 ft.



Problem 10—Minimum completion distance below gas-oil contact.

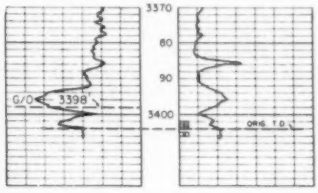
The initial production was 173 bbl. per day with 3/10 per cent cut and a gas-oil ratio of 2,329 to 1. There was no increase in gas-oil ratio until the well had been on production for 6 months. The last well gage was 108 bbl. per day with a gas-oil ratio of 7,194 to 1 and a slight reduction in the initial water cut.

The first test indicated that the perforations were too close to the gas-oil contact, and that the lowering of the perforations indicated that the critical distance between the gas-oil contact and the top of the perforations should be between 2 and 4 ft.

Problem 11—Minimum Completion Distance Below Gas-Oil Contact

This well was cemented with 500 sacks with rotary scratchers and centralizers on the bottom joint. The initial perforations from 3,402-04 ft. were squeezed in two stages with 200 sacks being used for each stage. The breakdown pressure recorded for the first stage was 2,900 psi. with subsequent maximum pressure of 2,200 psi. and a final pressure of 800 psi.

The second stage required a pressure of 1,900 psi. to break down the formation and a maximum pressure of 1,500 psi. was required to squeeze 185 sacks with a final pressure of 700 psi. The well was completed by perforating at the same level and flowed 2000 M.c.f. of gas and 20 bbl. of oil per day.



Problem 11—Minimum completion distance below gas-oil contact.

The production perforations were squeezed with 85 sacks of cement with a maximum pressure of 2,500 psi. being reached after the initial breakdown pressure of 2,200 psi. The final pressure after the squeeze was 2,100 psi. The shoe was drilled out to a total depth of 3,407 ft. and perforations made from 3,405-06 ft. with shaped charges. The initial production was 58 bbl. per day with a cut of 6 per cent and a gas-oil ratio of 998 to 1.

This completion indicated that the minimum distance between the top of the perforations and the gas-oil contact is approximately 4 ft.

Problem 12—Failure to Recognize Oil-Water Contact

The total depth of this well was 10,056 ft. with the initial perforations from 10,053-55 ft. First, 40 sacks of cement were squeezed with a maximum final pressure of 5,500 psi. after breaking down the formation with 3,000 psi. The well was reperforated at the same depth and came in making water.

Thirty-five more sacks were squeezed with the breakdown pressure recorded as 3,200 psi. and the maximum and final pressure as 5,200 psi. Two feet were perforated from 10,052-54 ft. and the well came in making pipe-line oil but turned to water.

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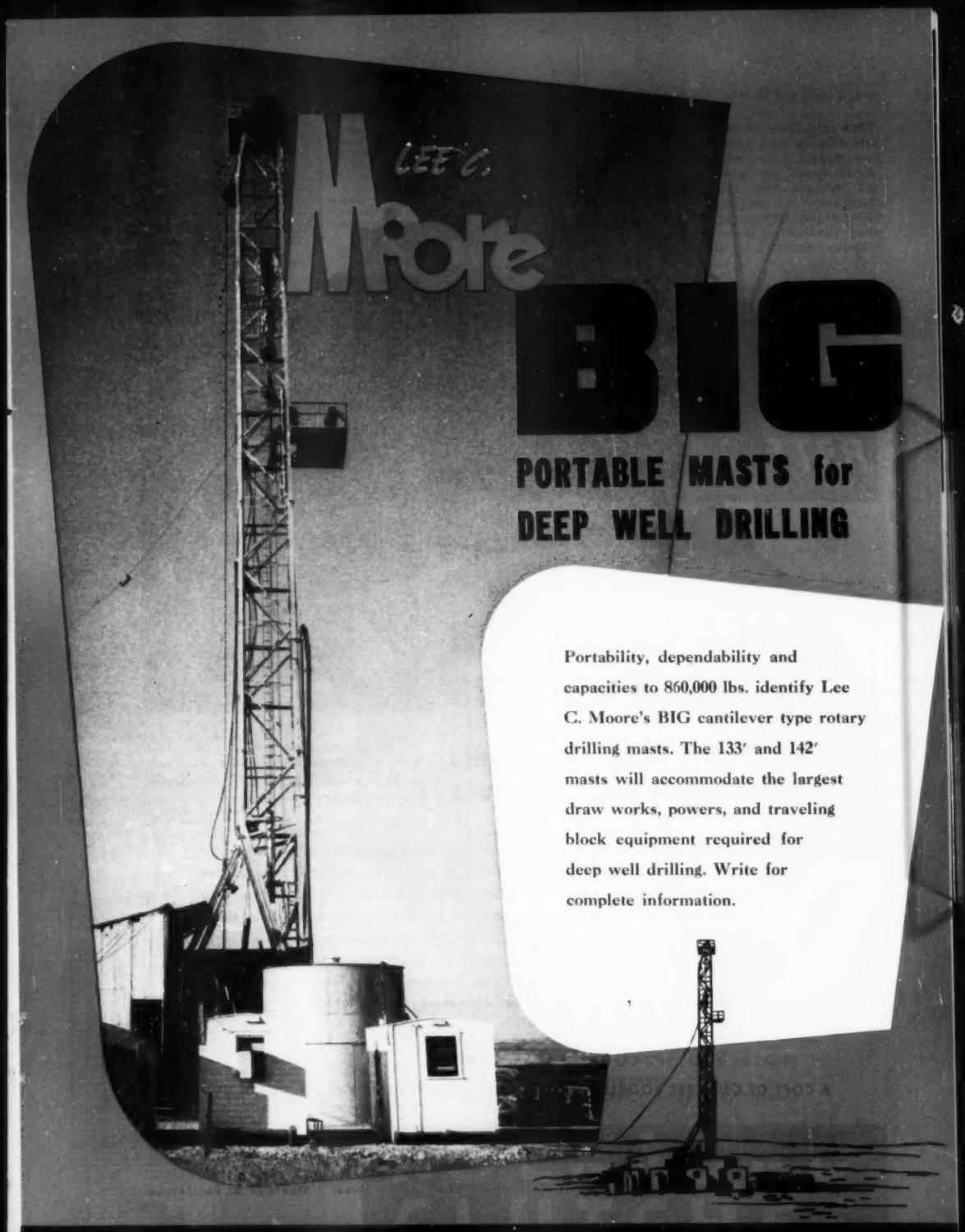
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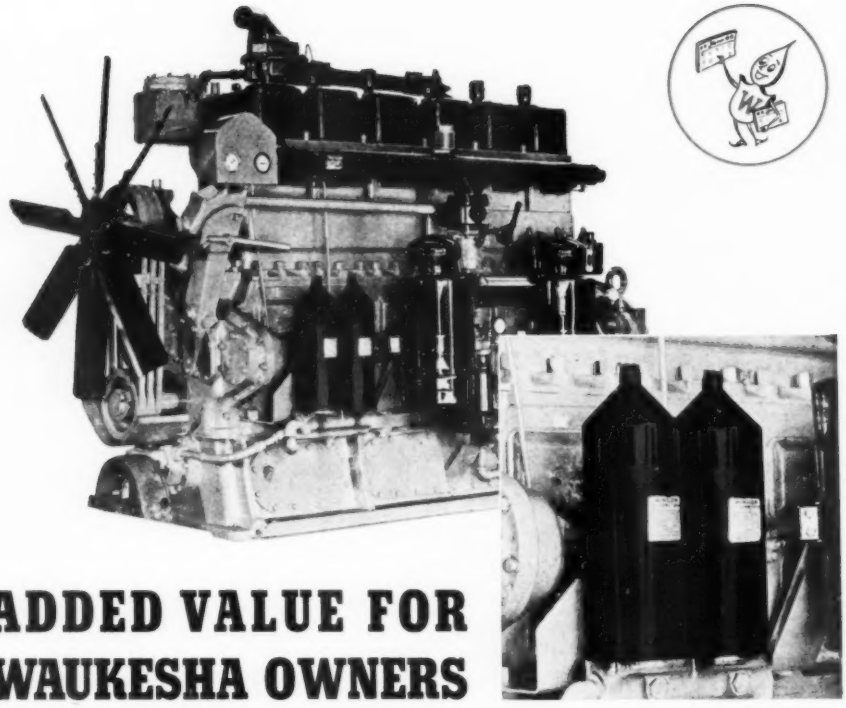

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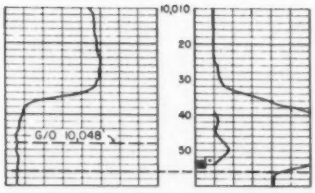


Problem 12—Failure to recognize oil-water contact.

The formation was broken down at 4,400 psi. and was washed with 250 gal. of mud acid which went in on a vacuum. Ten sacks of cement were then squeezed with a final and maximum pressure of 5,700 psi.

The well was again perforated from 10,052-54 ft. and on the initial production test made 78 bbl. of oil per day with 60 per cent water cut and a gas-oil ratio of 985 to 1. The water cut and gas-oil ratio increased to 80 per cent and 1,900 to 1 respectively, with a total 90 bbl. of oil being produced per day.

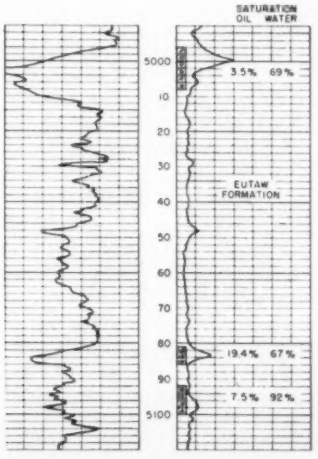
The final completion and the electric log indicate that the oil-water contact was at or near 10,053 ft. and better results might have been obtained by perforating only 1 ft. instead of the two that were used in this completion.

Problem 13—Failure to Squeeze Before Completion

This well was perforated for test from 5,092-5,100 ft. with 48 ½-in. shots. The well was swabbed for 12 hours with the packer set at 5,064 ft. with only a show of oil and gas. A second set of perforations were made from 4,996-5,008 ft. and from 5,081-86 ft. with six ½-in. shots per foot.

A packer was set at 4,975 ft. and the well was swabbed for 18 hours at the rate of 150 bbl. per day. The fluid was 98 per cent water. The perforations from 5,081-86 ft. and from 5,092-5,100 ft. were squeezed at the same time with 140 sacks of cement with a final pressure of 2,000 psi. The remaining open perforations were then tested by swabbing with the recovery being 99 per cent salt water. A two-stage squeeze was then made with 285 sacks of cement for the first stage with a final pressure of 3,000 psi. and 280 sacks were used for the second stage with a final pressure of 3,200 psi.

The well was again swabbed after reperforating from 4,996-5,008 ft. with six ½-in. shots per foot, and the fluid recovered was 100 per cent water. After the results of the last test the well was plugged and abandoned.



Problem 13—Failure to squeeze before completion.

The lower perforations had very little chance of producing because of the high water and low oil saturation. The middle and upper stringers may have had some recoverable gas or oil as indicated by the low residual-liquid content given by the core analysis. However, failure to squeeze the thin sections before testing could have been the cause of the high water-oil ratios.

Further, the upper section at 4,996-5,008 ft. definitely has an oil-water contact while the entire section was opened to perforations. Based on the electric log and core analysis the sands do not appear to have much possibility for production, but in many instances appreciable reserves have been passed up by improper completion practices.

Problem 14—Plugged Perforations

This well was cemented at 8,260 ft. using centralizers and scratchers. The well was plugged back to 8,232 ft. and perforated for test from 8,170-80

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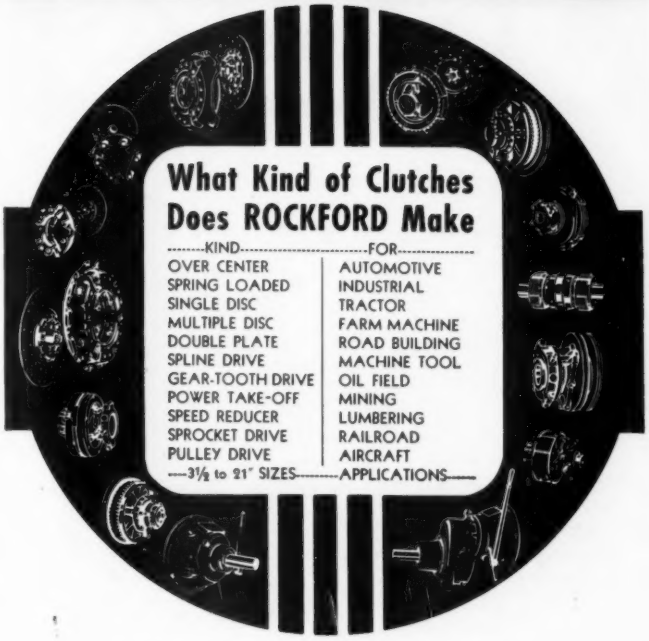

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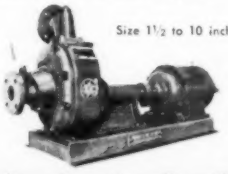

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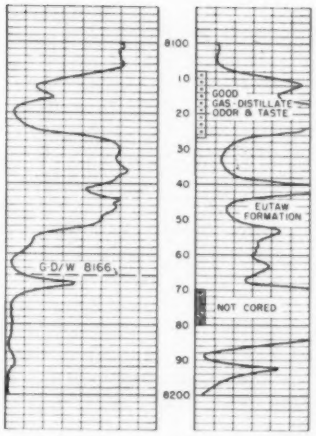


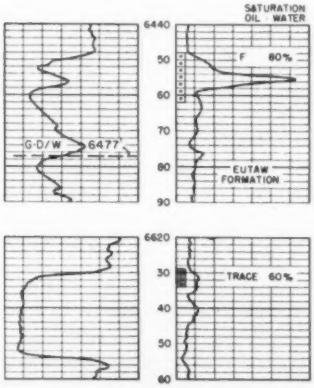
Problem 14—Plugged perforations.

ft. with 60 ½-in. holes. The initial production was 18.96 bbl. of 50.8° A.P.I. distillate and 3,183 M.c.f. of gas per day with 6/10 per cent b.s.&w. With these perforations open another section from 8,108-27 ft. was perforated with 114 ½-in holes.

After the well was washed and then swabbed down 500 ft. it kicked off and produced 18 bbl. of 51° A.P.I. distillate and 3,545 M.c.f. of gas per day with 2/10 per cent water. Production continued from this setting for 2 years at which time the well was reworked because of excess water production. The lower perforations were tested and found to be making 95 per cent water. These perforations were squeezed and the well plugged back to 8,150 ft.

The upper perforations tested dry and the section was reperforated with seventy-six ½-in. shots and resulted in a flow of 25.2 bbl. of 52.1° A.P.I. distillate and 2,960 M.c.f. of gas per day with 3 per cent b.s.&w. The initial production, after setting a packer and swabbing, was 15 bbl. of 52.1° A.P.I. distillate and 2,064 M.c.f. of gas per day. The total production from these two sections at the time of the last test was 9,217 bbl. of distillate and 1,534,304 M.c.f. of gas, and 45,115 bbl. of water.

The results of the tests on the perforations indicate that there was



Problem 15—Inability to obtain penetration.

no penetration in the upper section with the first perforation. It is suggested that in the event two sections are open to perforations, both sections should be drill-stem tested before completion.

Problem 15—Inability to Obtain Penetration

Four separate attempts at penetration were made with a total of sixty-nine ½-in. shots in the section from 6,629-32 ft. After each attempt to perforate with ½-in. shots, tests were run and all tested dry except the fourth which had a recovery of 2.56 bbl. of distillate and 86,523 cu. ft. of gas with a 2 per cent cut.

Perforations were made for a test from 6,448-54 ft. with thirty-six ½-in. shots and with both sets of perforations open tested 3.8 bbl. of distillate and 88,787 cu. ft. of gas with 60 per cent water per hour. A two-stage squeeze was made on the lower perforations with 150 sacks being squeezed on the first stage with a final pressure of 1,800 psi., and 50 sacks being squeezed on the second stage with a final pressure of 1,900 psi.

The section from 6,448-54 ft. was retested and recovered 92 ft. of distillate and 122 ft. of distillate-cut mud. This same section was reperforated, tested, and recovered 117 ft. of distillate and 45 ft. of distillate-cut mud. Eight additional feet were perforated with six ½-in. shots per foot and a test of the section from 6,448-62 ft. gave a flow of 0.6 bbl. of distillate and 99,097 cu. ft. of gas with 1 per cent b.s.&w. per hour.

A production packer was set above the top perforation and the initial production was 19.2 bbl. distillate and 2,641,171 cu. ft. of gas with 4/10 per cent b.s.&w. The

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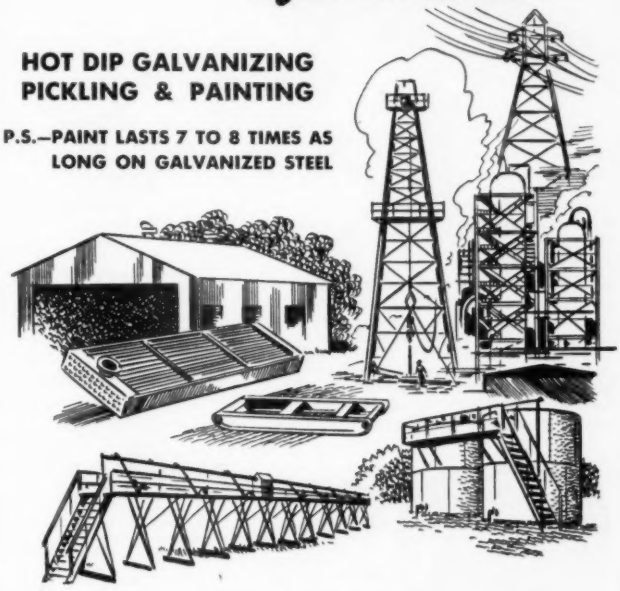

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cumulative production after a 2½-year period was 6,998 bbl. of distillate, 974,446 M.c.f. of gas, and 926 bbl. of water.

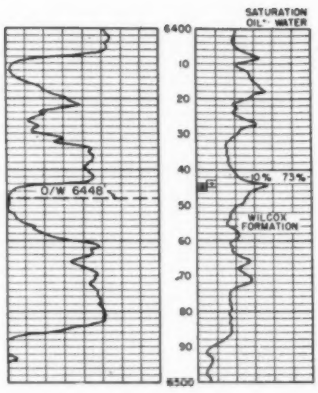
The difficulty in obtaining penetration demonstrates the advisability of testing each set of perforations separately.

Problem 16—Failure to Squeeze Before Completion

Centralizers and scratchers were placed on the bottom 280 ft. of the oil string. Perforations were made from 6,444-46 ft. with six ½-in. shots per foot, and the well tested 45 bbl. of which 75 per cent was salt water. One hundred twenty-eight sacks of cement were squeezed with a final pressure of 4,100 psi. A drill-stem test was made on these perforations and recovered 45 bbl. of oil per day with a 29 per cent cut.

The perforations were again squeezed with a total of 160 sacks of cement with 5,000 psi. maximum and final pressure. The test after this squeeze recovered the water cushion and 10 ft. of mud. Perforations were then made from 6,443-45 ft. with twelve ½-in. shots. The well flowed at the rate of 57.6 bbl. with 45 per cent cut. On completion the well came in flowing by heads. After setting a pumping unit the initial production was 92 bbl. of oil and 138 bbl. of salt water. The total production for 5 days was 456 bbl. of oil and 806 bbl. of water.

The perforations should have been squeezed before testing to reduce the tendency of water coning. The thickness of the saturated section as indicated by the electric log was only 4 ft.



Problem 16—Failure to squeeze before completion.

Conclusions

Scratchers and centralizers apparently aid in getting good primary-cement jobs. They are usually placed from the bottom to approximately 300-500 ft. above the highest prospective sand except in the case of rotary scratchers which are placed 15-20 ft. above the sand.

If the proper technique is used there should be no difference in the length of pipe equipped with the various types of scratchers. The use of such equipment eliminates to a certain extent the necessity of block squeezing before completing. However, it is general practice for some companies to squeeze even though the previously mentioned equipment is used.

The same perforations or perforated interval is used in many cases for both squeezing and completion. If the production squeeze does not block the perforations, they are used for completion without reperforating. It was thought that one reason the perforations were not plugged after a squeeze job was that shale and shaly sands behaved as a plastic and would flow under pressure. This would either force the mud-filter cake into the overlying perforations through which cement was not flowing or plug the perforations with shale.

Another reason is that if the cement sheet outside the pipe is relatively thin, the differential caused by releasing the squeeze pressure or the pressure differential due to production would be sufficient to break the cement into the well bore. If two zones are perforated for completion, it is suggested that each zone be drill-stem tested before final completion.

It was thought that better squeeze jobs could be obtained if shaped-charge perforations were used because

(Continued on page 137)

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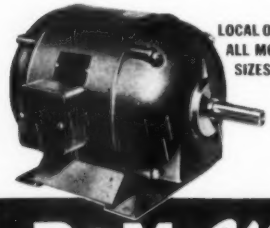

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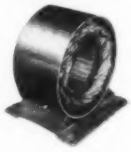

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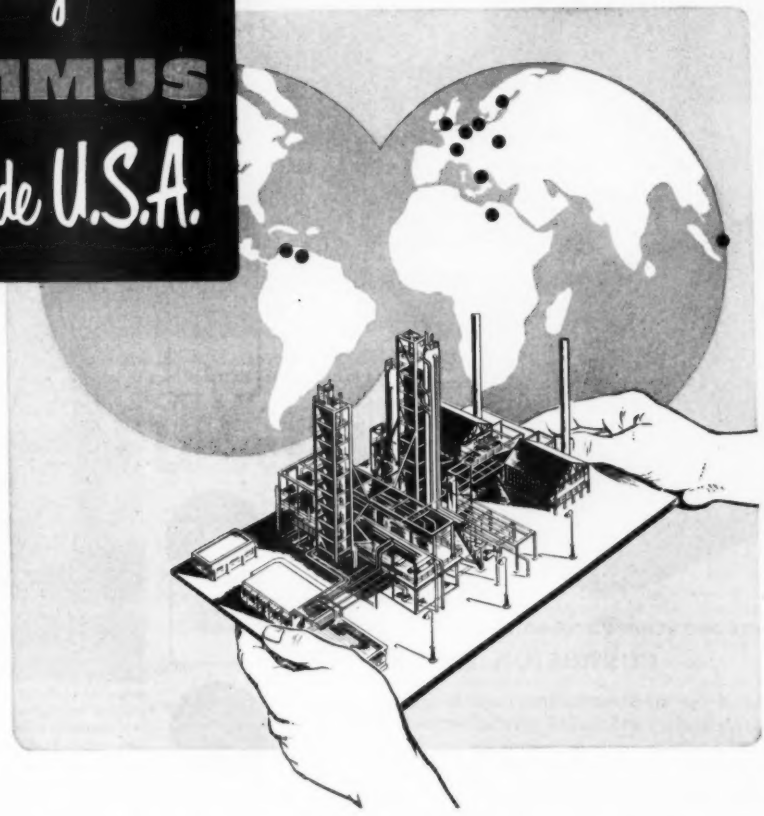

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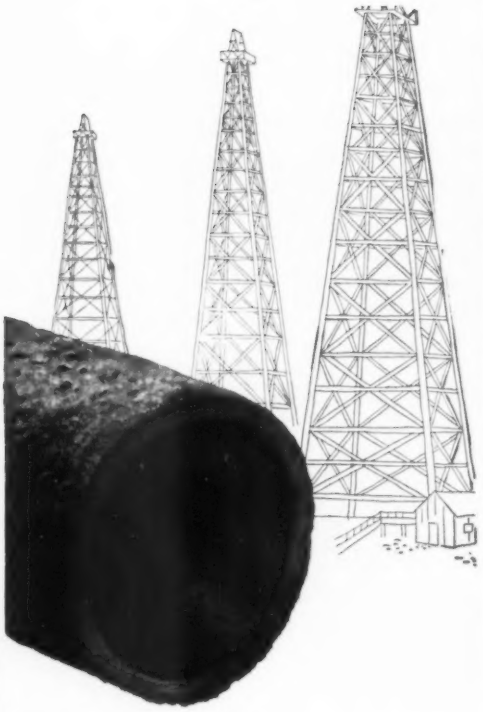

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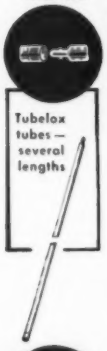

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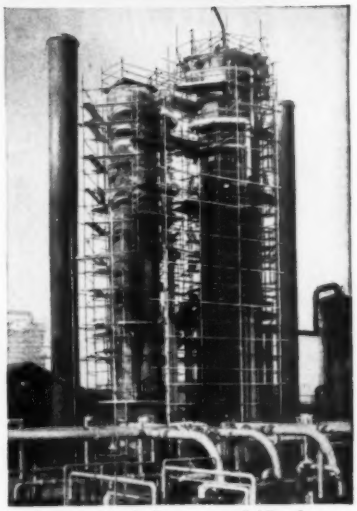

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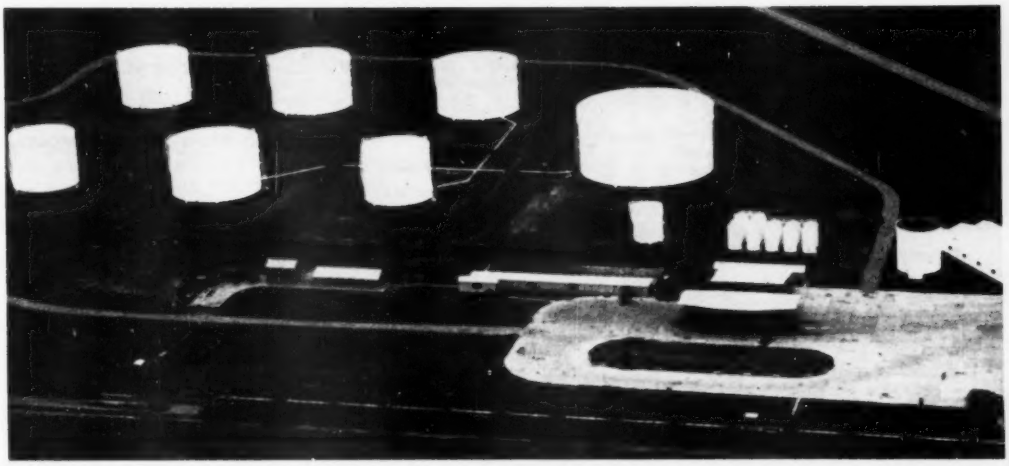

Fig. 1—Moorhead, Minn., terminal of Standard Oil Co. (Ind.). The 97,000-bbl. expansion-roof tank, right, connects with one 24,000-bbl. and two 43,000-bbl. cone-roof tanks.

Evaporation Losses Held Near Zero

A study of operating data, instrument recordings, and gaging figures shows terminal losses held to near zero. Two years' records are analyzed and presented with description of operation and equipment. Conclusions show that proper terminal construction will provide complete control over evaporation losses.

by R. N. Creek*

AN intensive study of evaporation losses at the Moorhead, Minn., products pipe-line terminal of Standard Oil Co. (Ind.) was carried on for a period of 2 years. This study indicated that with proper planning and careful operation losses can be held to figures so low as to be practically negligible.

Evaporation in Storage

Shrinkage of gasolines, naphthas, and crudes while in storage results in obvious economic losses to those who produce or handle petroleum products. This same condition holds true for distillates and fuel-oil stocks. Thus, the shrinkage problem has long been a thorn in the side of the entire petroleum industry.

One per cent shrinkage in a single storage operation, while not the usual case, is nevertheless not rare. Evidence has been gathered toward the conclusion that an average of 0.20 or 0.25 per cent is generally accepted by the oil industry as a reasonable shrinkage allowance for each storage and/or transportation operation.

Since there are at least three storage operations in the handling of products after refining (refinery storage, in-transportation storage, marketing storage), it is easily seen that the allowable figure mentioned above, when compounded at each operation, quickly approaches and often exceeds 1 per cent. It is readily apparent, therefore, that in an industry-wide consideration the economic losses resulting from evaporation are in terms of millions of dollars annually.

The magnitude of these losses was realized many years ago and, for over 25 years, considerable research has been carried on within the oil industry and by its suppliers to bring such losses within controllable limits. The resultant developments in equipment and methods have been applied with varying success to reduce both storage and filling losses.

The loss in marketing terminal storage is perhaps the most critical, for it is here that gasoline has reached its ultimate value to the oil company. For the independent marketer shrinkage represents actual cash loss, since his product has been purchased on an exact volume basis. It is thus understandable that the emphasis on vapor conservation has been the strongest in protecting storage at marketing terminals.

Expansion-Roof Theory

Before a resume of loss information is undertaken, an outline of the elements of an expansion-roof-manifolded cone-roof system is in order. An expansion-roof tank is essentially a combination of a standard cone-roof tank shell with a single-lift gas holder comprising the upper 5 or 10 ft. On

*Conservation engineer, Graver Tank & Manufacturing Co., Inc.

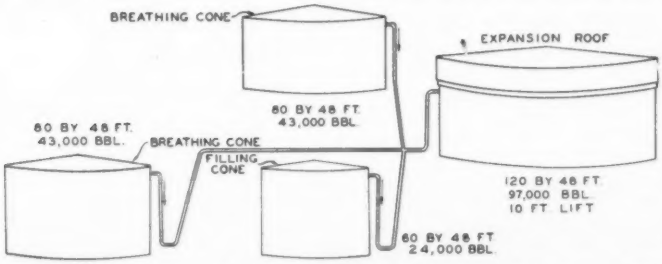

Fig. 2—Schematic arrangement of an expansion-roof tank interconnected via vapor lines to a number of standard cone-roof tanks.

a 40-ft.-high tank, for example, the roof and its skirt ring are free to move through a liquid seal 10 ft. to a total tank height of 50 ft. Product is stored only in the 40 ft. of tank shell; the variable 10-ft. space above acts as a reservoir for gases generated by evaporation, for increases in vapor volume due to thermal expansion (roughly equal to Boyle's law), and for the displacement of vapors due to filling the tank with product. (See thermal expansion example.)

Thermal Expansion Example

1. Tank inventory = 50 per cent.
2. 50 per cent vapor space (120-ft. diameter tank) = 272,000 cu. ft.
3. Temperature rise from 32° F. = 50°.
4. Per cent expansion = 542/492 × 100 — 100 = 10 per cent.
5. Available expansion roof capacity (already 50 per cent expanded) = 55,000 cu. ft.
6. Expansion = 27,000 cu. ft.
7. Thus: 28,000 cu. ft. still available.

By interconnecting the expansion-roof tank with vapor lines to a number of standard cone-roof tanks, these rigid-roof tanks themselves become protected from loss due to thermal effects (evaporation and gas expansion). They also serve as reservoirs against losses due to displacement since, while product is being received into one tank, product is generally being loaded out to other transportation from another tank in the system. (See balance pumping example.) The diagram (Fig. 2) graphically illustrates the expansion-roof principle.

Balance Pumping Example

1. Flow in = 400 bbl. per hour (3 hours) = 6,700 cu. ft.
2. Flow out = 3 meters at 400 g.p.m. (used for 1 hour) = 1,700 cu. ft.
3. Total unbalanced = 5,000 cu. ft.
4. 120 ft. diameter roof capacity (already 50 per cent expanded) = 55,000 cu. ft.
5. Thus: 50,000 cu. ft. still available.

Standard's Terminal Design

In the spring of 1946 the marketing construction department of Standard Oil Co. (Ind.) began the design of five storage terminals planned in conjunction with the new 675-mile Northwest Pipeline; each terminal was to incorporate the latest design and improvements in pumping, metering, control facilities, tankage, and operation. Due to the many favorable operational and economic factors involved, the tankage at Rochelle, Dubuque, Spring Valley, and Moorhead was designed for the expansion and cone-roof manifolded systems. Tankage at Minneapolis, on the other hand, was to be of floating-roof construction due to the very high product turnover anticipated.

At all expansion-roof terminals, other than Moorhead, product was to be "stripped" from the line so that the pumping rate into these systems would be low and the systems would always be able to compensate, by means of their expansion capacity, for any positive unbalance between filling and withdrawal rates. In other words, during filling, no venting (with attendant evaporation losses) was to be allowed.

As an example of how well this system has worked out in practice, pressure-recording charts indicate that there was a total venting time of only 48 hours in the entire year of 1949 at the Spring Valley terminal, this on receipts of over 50 million gallons. Moorhead, on the other hand, is the terminus of the line; all receipts are at full stream, but factors such as a small line size and greater shipping facilities have created little unbalance in the system. Venting in 1949 was 242 hours on 120 million gallons received.

Working along the lines of a performance study, an intensive investigation of all operating conditions related to storage losses was recently undertaken at the Moorhead terminal for the calendar year of 1949, since it was felt that Moorhead represented

TABLE 2—TANK TURNOVERS PER YEAR

Product—	1948	1949
Red Crown	18.5	4.1
Blue Crown	4.1	9.5
White Crown	8.5	17.5
Power Fuel	6.6	12.0

TABLE 3—1949 PRESSURE RECORD

Month—	Pressure hours: Venting	Operating	Intermediate	Vacuum
January	No records due to instrument breakdown			
February	0	416	179	77
March	36	432	162	114
April	18	524	156	22
May	20	456	162	86
June	41	529	105	45
July	24	429	239	52
August	4	548	132	60
September	0	516	145	59
October	7	497	149	91
November	14	472	114	120
December	78	368	209	89
Total	242	5,187	1,772	915
% of total	3	64	22	11

TABLE 1

	Red Crown Tank No. 1 97,000 bbl.			White Crown Tank No. 2 24,000 bbl.			Blue Crown Tank No. 3 43,000 bbl.			Power Fuel Tank No. 7 43,000 bbl.		
1948—	Receipts, 1,000 gal.	Loss, gal.	Per cent	Receipts, 1,000 gal.	Loss, gal.	Per cent	Receipts, 1,000 gal.	Loss, gal.	Per cent	Receipts, 1,000 gal.	Loss, gal.	Per cent
January	2,299	20,780	.915	895	2,676	.298	68	2,493	3.661	319	+872	+.273
February	2,874	8,207	.286	793	+638	+.081	164	1,468	.895	449	+356	+.079
March	2,427	6,139	.253	444	3,846	.869	331	1,194	.361	959	+233	+.024
April	5,298	+7,855	+.148	92	+268	.292	423	+136	+.032	836	+5,227	+.631
May	5,068	+14,678	+.290	641	2,482	.387	1,982	+1,300	+.066	871	+9,881	+1.125
June	9,102	+21,331	+.234	659	1,233	.187	1,100	714	.065	2,214	+1,071	+.048
July	8,726	10,933	.125	638	2,501	.392	525	+1,350	+.257	1,315	+760	+.058
August	10,606	11,835	.112	1,358	2,222	.163	319	217	.068	1,482	+933	+.063
September	10,096	9,391	.093	793	4,060	.513	1,441	691	.048	1,871	2,429	.129
October	6,808	+9,432	+.138	1,067	2,391	.224	731	+419	+.057	940	+2,987	+.316
November	6,801	+16,026	+.236	594	2,896	.489	255	+1,718	+.673	426	+1,341	+.315
December	4,965	21,791	.438	813	1,082	.133	0	386		287	3,634	1.262
Total	75,070	19,754	.026	8,787	24,483	.279	7,339	2,240	.030	11,969	+17,598	+.146
	Over-all total 1948 = 0.028 per cent											
1949—												
January	5,001	+2,512	+.050	1,603	3,667	.239	278	+1,177	+.423	280	+5,584	+1.990
February	1,105	6,237	.564	823	1,393	.169	0	1,335		249	933	.374
March	3,275	7,151	.219	751	1,503	.201	702	1,190	.169	580	+3,815	+.657
April	9,484	22,883	.304	125	1,427	1.426	1,035	+1,901	+.183	792	+4,765	+.602
May	12,576	+50,511	+.401	743	+3,469	+.467	542	+2,218	+.408	1,021	+5,661	+.554
June	7,375	1,676	.227	430	4,129	.970	1,266	2,306	.182	2,436	+3,920	+.161
July	9,925	11,916	.120	907	1,847	.203	1,523	+331	+.217	1,706	1,403	.082
August	13,328	+8,553	+.064	1,027	2,624	.263	1,033	859	.083	491	+3,047	+.621
September	10,244	+3,936	+.038	643	6,147	.965	951	+3,839	+.404	1,101	+1,781	+.156
October	7,756	+7,648	+.099	789	+4,079	.517	460	943	.205	364	+825	+.226
November	5,654	+8,562	+.152	986	1,114	.116	272	+1,557	+.572	351	+933	+.266
December	6,175	15,036	.262	354	+193	+.054	1,572	359	.228	238	1,131	.475
Total	91,898	+16,823	+.018	9,181	16,110	.176	9,634	+4,031	+.040	9,609	+26,801	+.268
	Over-all total 1949 = +0.026 per cent											

Refinery Expansion by Million Barrels Daily Held U. S. Need

Special to THE WALL STREET JOURNAL

SAN ANTONIO — The nation must add 700,000 barrels a day to its basic crude oil refining capacity by the end of 1952 and a million barrels by the end of 1953.

Bruce K. Brown, deputy administrator of the Petroleum Administration for Defense, brought this measure to the Western Petroleum Refiners Association in convention here yesterday.

By the end of 1956, Mr. Brown said, new basic refining capacity must exceed 1,600,000 barrels a day. If possible, he said, these goals will be reached without recourse to special loans under the Defense Production Act or to government-owned plants. New construction will be encouraged by tax amortization and material priorities.

Basic refining projects already approved from the standpoint of tax certification, the deputy administrator noted, will require the investment of $318 million of private funds and will increase national petroleum refining capacity by 370,000 barrels a day.

"Unless and until P. A. D. is convinced the necessary expansion of basic refining capacity cannot be accomplished by normal methods," Mr. Brown declared, "it will not recommend special loans under the provision of the Defense Production Act. Such taxpayers' money as is available should, we believe, be used for necessary projects which offer smaller hope of attainment by normal methods of finance."

Mr. Brown added the goals he named for the next few years "may be insufficient if international tensions increase."

Besides finished products of the type normally needed, Mr. Brown said: "There is also a highly pressing need to increase our capacity to produce special military products, such as jet fuel and aviation gasoline, and to produce critically needed products such as benzene." Such production, he noted, is dependent on the desired increase in basic capacity, however.

At present, he said, there is a special need for greater dispersal of refineries into safe interior locations.

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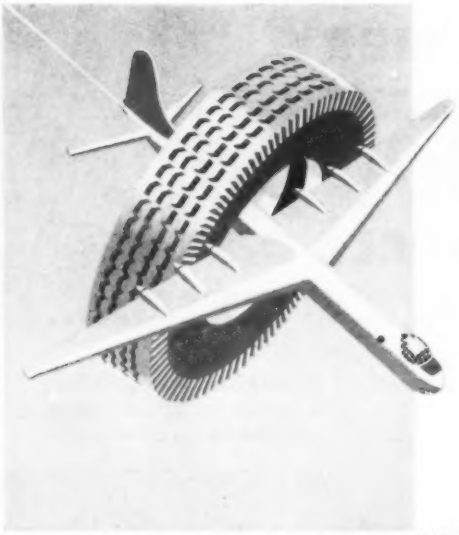

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an ideal installation for the analysis of an expansion-roof system. Records were kept of daily receipts, withdrawals, and gagings, along with a pressure record of the entire system which showed venting hours. Tests also were made to indicate any leakage from vents while in the closed position. Two 43,000-bbl. cone-roof tanks and one 24,000-bbl. cone-roof tank were connected by vapor lines to a 97,000-bbl. expansion-roof tank with an expansion capacity of 114,000 cu. ft. Fig. 1 is an aerial view of Moorhead terminal showing the interconnected expansion-roof vapor system.

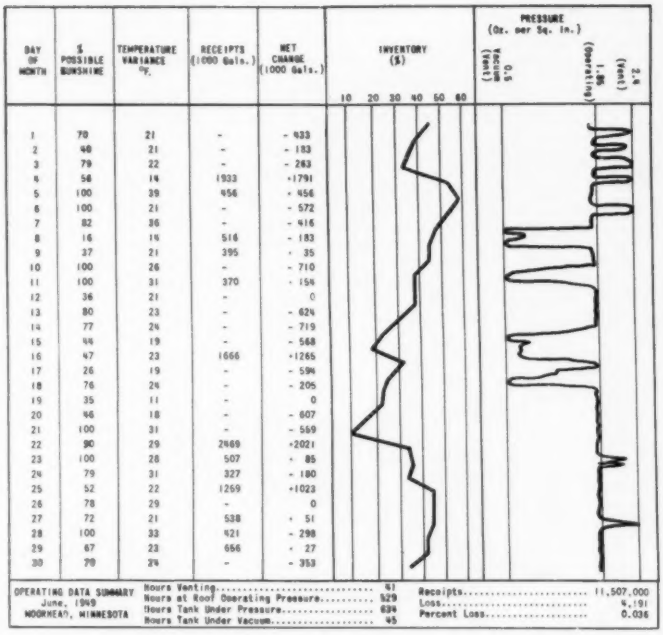
Loss Data

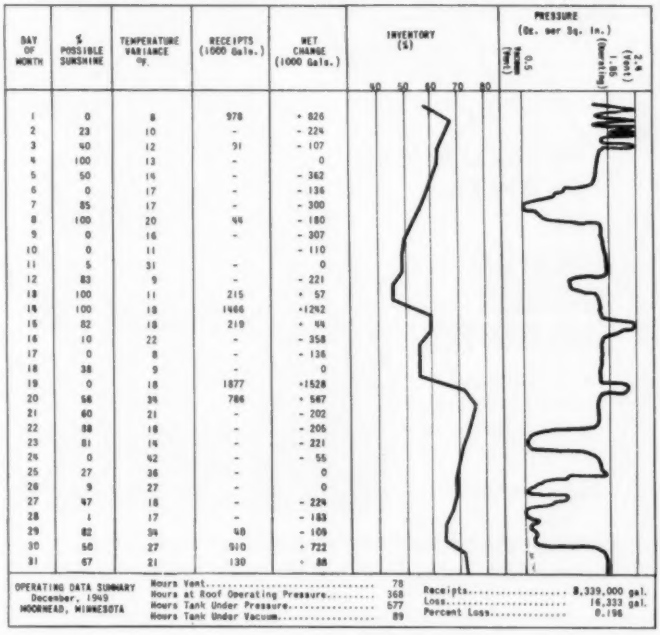
Table 1 shows monthly throughput and product gain or loss by gaging and temperature corrections for all four fuels contained in the expansion-roof system during 1948 and 1949. While it is quite possible to make errors in both gaging and temperature correction on a day-to-day basis, it is reasonable to assume that, if extant, these errors compensate one another so that a yearly average will be accurate within a very small fraction of 1 per cent. It is interesting to note that even though the total loss or gain by product varies, the over-all total is within 0.06 per cent for a 2-year period. "Power Fuel" being a low-vapor-pressure product, it is logical to suspect that the light ends evaporated from the higher vapor pressure products will condense into the Power Fuel and, thus, indicate gains. Percentage-wise on throughput, this is actually so small that laboratory analyses show no effect on specifications of Power Fuel.

A careful study of Table 1 will show that although the over-all system loss is remarkably low, the "White Crown" loss is quite high. Table 2 and considerations of the system will help explain this phenomenon. "Red Crown," even with its high turnover, is protected by the expansion roof so it is very seldom that vapors leave this tank via the vapor line to condense in another product (i.e., Power Fuel). Such is not the case with White Crown, however, which has the next highest turnover. When product is received in this tank, or the vapors expand thermally, gases immediately enter the vapor lines. After a short period of pressure rise (system operating pressure 1.85 oz. per sq. in.) these are fed into the expansion roof which then rises, and to the Power Fuel vapor space, which expands more slowly due to its lower vapor pressure. However, the total economic value does not drop appreciably since almost all of the vapors are kept within the system—as can be seen from Table 1.

Points of Vapor Escape

As already mentioned, the primary reason for study was vapor loss, measured in dollars and cents, and thus all points of vapor egress were closely examined. Continual checks were made at all possible escape locations in the Moorhead vapor system—welded roof seams, vapor line p[illegible]ints, foam-extinguisher connection[illegible]nd the pressure-vacuum relief vent[illegible] The vents are, of course, the most [illegible]kely places to expect vapor leakage [illegible]nce the pallet-to-seat connection functionally must be free to separate for vapor passage under their limiting conditions and yet still be free, ideally, from any vapor leakage under normal operating conditions. No leaks have yet been discovered in any of the welded joints, and the vents are





performing well within reasonable limits.

Theoretically, a perfect "seating" is possible; however, it is recognized that warpage due to temperature changes and general wear and tear will eventually allow the escape of small amounts of vapor. In order to determine this leakage a displacement meter was designed in the field which gave good results.

In general it was found, as was expected, that leakage from a vent increases as the pressure in the system nears the relief pressure, and also that each vent presents a different leakage picture; i.e., shows different rates of wear. This latter, too, was a reasonable expectation inasmuch as the relief setting on the expansion-roof tank is 0.25 oz. lower than on the cone-roof vents; thus the expansion-roof vent is much more active than the other vents which provide only for emergency conditions and are not expected to operate under normal venting conditions within the system.

The greatest leakage loss rate was shown by the vent on the expansion roof immediately before the normal maintenance procedure of "lapping in" the seat and pallet for a perfect fit. Approximately 500 cu. ft. per hour under full operating pressure was the greatest vapor loss discovered. This, using a figure of 10 gal. of gasoline per 1,000 cu. ft. of vapor as an average concentration and the total hours of operating pressure as seen from Table 3, gives an annual loss of from 3,000-5,000 gal. for the entire system, which defies measurement in relation to the large annual throughput. The total annual undesired leakage from the system, while only an approximation of the right magnitude, is seen to be so small as not to be reflected in the annual loss statement.

Operating Data

Table 3 and the attendant charts graphically illustrate the operation of the system. Table 3 is a summation of each day's pressure chart for the entire system.

Normal cone-roof systems would be venting valuable gasoline vapors to the atmosphere at all times when venting pressure is indicated; in this case, however, the expansion roof is storing up the vapors in its reservoir against their subsequent condensation. Parenthetically, it is well to mention here that the reader who wishes to compare the operations and construction economics of cone, expansion, and floating roofs, can do so by reading Sun Oil Co.'s latest report entitled, "A Method for the Selection of Tankage for the Storage of Gasoline," by H. S. Mount and A. C. Barron.

The operations summary charts for June and December show the various factors—receipts, net receipts, per cent sunshine, and daily temperature changes—and their cumulative effects upon the expansion-roof vapor-reservoir system. As indicated above, operating pressure is that pressure which causes the expansion roof to rise, thereby creating a variable vapor reservoir.

Noteworthy is one of the days such as June 6, December 2, or December 3 on which venting occurs even though inventory actually decreases. This illustrates the great influence of sunshine and temperature change in causing thermal expansion of vapor space. Each case follows a period of large receipts which lift the roof near to its maximum rise.

Dollar Savings

While it is not possible to calculate exactly the annual savings in this or any like system, a good approximation of the magnitude can be reached by considering the information presented herein for the months of June, a typical summer month, and December, a typical winter month.

Using an average figure of 10 gal. of volatilized hydrocarbons per 1,000 cu. ft. of vapor displaced by in-pumping, and totaling the daily displacements for each month we will arrive at a good approximation of the gallons of hydrocarbons which would have been lost in a normal isolated cone-roof terminal. We will

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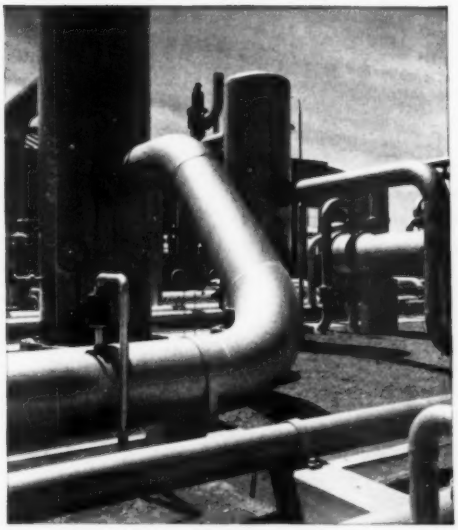

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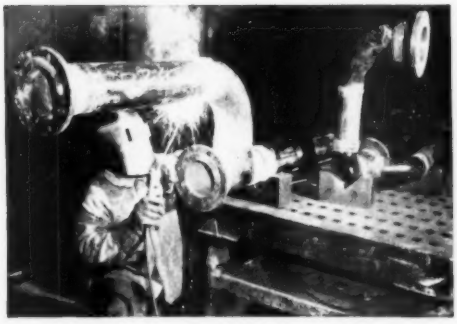

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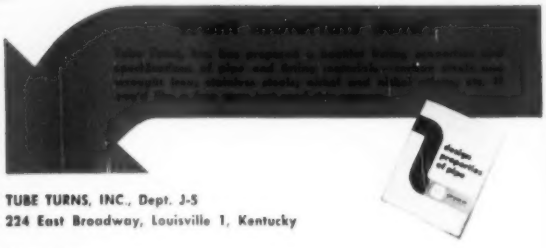

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consider two bases; total displacement and net positive displacement, the difference between the two indicating the saving by merely interconnecting the tanks with vapor lines to take advantage of balanced pumping. Savings are calculated as follows:

June total displacement = 11,517,000 gal. × 5.61/42 × 0.01 = 15,433 gal.; at $0.12/gal. = $1,852. Net positive displacement = 6,905,000 gal. × 5.61/42 × 0.01 = 9,253 gal.; at $0.12/gal. = $1,110.

December total displacement = 6,756,000 gal. × 5.61/42 × 0.01 = 9,503 gal.; at $0.12/gal. = $1,086. Net positive displacement = 5,074,000 gal. × 5.61/42 × 0.01 = 7,743 gal.; at $0.12/gal. = $929.

Yearly total ($1,852 + $1,086) × 6 = $17,628.

Yearly net total ($1,110 + $929) = $12,234.

Savings vapor piping ($17,628 — $12,234) = $5,394.

Expansion roof = $12,234.

We must take into consideration the amount of displacement which was lost through venting. The average pumping rate varied from 100-200 bbl. per hour or from approximately 600-1,200 cu. ft. per hour. From Table 3 it is found that total venting was 242 hours. Using 1,000 cu. ft. per hour we arrive at venting loss thusly:

1,000 × 242 × 0.01 = 2,420 gal. at $0.12 per gal, loss from venting for 1949 = $290

Savings per year:

Vapor piping = ($17,628 — $12,234) = $5,394.

Expansion roof = ($12,234 — $290) = $11,944.

The above data support the general conclusion that proper long-range planning before construction, considering factors such as pumping rates, throughputs, tank size, and other pertinent data, will allow of essentially complete control of vapor losses. This does not suppose that other potential loss points—faulty meters, spillage, or leakage such as from bad tank bottoms—can be neglected.

Thin Oil-Column Completions

(Continued from page 126)

of a more uniform pattern, greater penetration, and less chance of cracking the cement.

It was the opinion of the committee that the minimum distance for completion was 4 ft. below the gas-oil contact and 2 ft. above the oil-water contact. It was pointed out that by theoretical generalizations, other things being equal, it should be possible to successfully complete nearer a gas-oil contact than an oil-water contact. That the opposite is indicated by this study is partially due to: (1) The conservative manner in which the oil-water contacts were selected coupled with the generally thinner gas-oil transition zones as compared with oil-water transition zones; and (2) that drawdowns in these saturated reservoirs cause gas to come out of solution and tend to develop relative permeability to gas.

Gravel packing was considered to be more successful than plastics; however, there were failures reported using both methods. It was suggested that the casing be milled out opposite the producing section and underreamed before gravel packing to give a greater productivity index and to reduce the velocity of flow through the outer edge of the pack.

In contrast to other areas, in the Gulf Coast production is obtainable even in these thin sections with drawdowns as low as 50-60 psi. Because of this water and/or gas is successfully shut off with relatively small cement intervals.

One reason for the failure to obtain satisfactory completions by the above methods was placing the top of the sand at the first increase of the self-potential curve rather than at the point of inflection. The opening of this sandy-shale section to perforations resulted in plugging the plastic or gravel pack.

Acknowledgment

The author wishes to acknowledge the many suggestions and free exchange of ideas of the A.P.I. Thin Oil-Column Subcommittee. The author also wishes to especially thank Benjamin C. Craft, Louisiana State University; J. Howard Rambin, Jr., The Texas Co.; Earl M. Kipp, California Co.; and Weldon W. Ramseur, Gulf Oil Corp.

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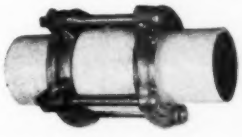

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Radiant Heating

(Continued from page 108)

test while cracking gas oil is shown in Table 1, which discloses:

1. Average radiant heat transfer rate is 17,000 B.t.u. per sq. ft. per hour.
2. Average convection heat transfer rate is 4,920 B.t.u. per sq. ft. per hour
3. Heater efficiency—81.5 per cent.
4. Excess air in stack—9.2 per cent.

The Orsat analyses were checked by running duplicate samples on a mass spectrometer. The tests disclosed that the east end of the heater was operating with less than 1 per cent excess air while the west end was firing with about 15 per cent excess air, giving an average at the stack of 9.2 per cent. To account for the difference, it should be reported that the east-end header box is completely sealed while the inlet and outlet piping as well as eight return-bend thermocouples pass through the west header box. No attempt has been made to seal the opening. Sealing at these leakage points should further improve test results.

Firebox temperatures seldom exceed 1,550° F. even under severe firing rates. Temperatures at the bottom of the furnace are slightly higher than those at the shock tubes just below the convection section. This low box temperature combined with the low per cent of excess air present should reduce the oxidation of the heater tubing and tube-sheet material considerably. The economy of low excess air also shows up in the fuel bill. An approximation of the savings in dollars that can be effected by the reduction of excess air is shown for a specific heater in Fig. 3. By reducing the excess air from 100 per cent to 10 per cent on a 30-M.M. B.t.u. heater, using 15 cents per M.M. B.t.u. gas, a yearly saving of $15,600 can be realized on gas consumption alone.

A new radiant cup burner of the totally inspirating type (K-901-91, Fig. 2) has been developed and installed in several radiant heaters in our refineries. This development has eliminated the air blower, ratio controller, as well as the controls and safety devices necessary with air-gas premixing equipment. Operation of the totally inspirating burners has been very satisfactory. The totally inspirating burners operated with no trouble at wind velocities as high as 40 m.p.h.

Since the burners have no moving parts there is no maintenance problem. The burners light easily and burn uniformly and require practically no attention from the operator.

The dampers and design of the stack breeching give excellent control of the draft. The draft is uniform in all parts of the heater and there is no channeling of flue gases so that the flow of gases over the tubes is uniform.

The header boxes on both ends of the heater are bolted on and give excellent sealing of air from the ends and are easily removed from access to the return bends or replacing tubes if required.

With all welded return bends the coil is easily adapted for burnout and decoking time is reduced to a minimum which increases the actual on-stream time of the unit.

A split tube should cause little firebox fire damage in view of the low excess air. All refractory in the furnace is readily accessible and easily removable so that replacements may be easily made.

Operating Results

Gas-oil cracking.—Although the radiant heater was purchased primarily for the vis-breaking of a vacuum-reduced topped crude, it was decided to start up on a light gas-oil product from a once-through gas-oil cracking operation. This was especially interesting since the same charge stock was being thermally cracked on a once-through basis in a box heater designed and constructed in 1933.

In general, it was found that on single-pass cracking of both catalytic cycle oil and virgin gas oil, the radiant heater obtained conversions (gasoline plus gas) of 40-50 volume per cent and higher without excessive coil coking. In addition, the radiant heater yielded a gasoline having a

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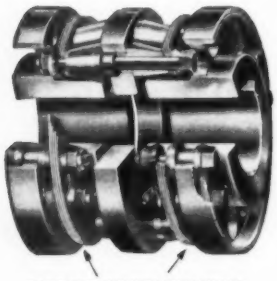

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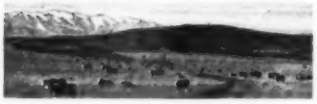

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research octane rating of four to six units higher than is normally obtained from thermally cracking a similar charge stock with the Borger refinery conventional heaters.

Table 2 shows the effectiveness of the radiant furnace in increasing cracking severity and improvement of gasoline octane ratings and yields over the old type box furnace. It was not possible within the coking limits on the box furnace to reach the conversion levels obtained on the radiant heater. Comparable trends in conversions and results have been obtained charging virgin gas-oil stocks.

TABLE 2—SINGLE-PASS CRACKING OF CATALYTIC CYCLE OIL

Charge stock:			
Gravity, °A.P.I.			33.9
Aniline point, °F.			156
A.S.T.M. distillation:			
I.b.p.			436
50 per cent			559
End point			669
	Radiant heater		Box heater
Operating conditions:			
Coil outlet temp., °F.	1,025		920
45th tube temp., °F.	948	934	
Inlet pressure, psig.	700	600	1,100
Charge rate, bbl. per hr.	100	100	300
Aniline point reduction, °F.	50	37	35
Yields, liquid-volume per cent of charge:			
Gas, M.c.f. per hour	51.9	32.7	
Gasoline	31	28	22
Gas oil	41	54	57
Fuel oil (300 S.F.V. at 122° F.)	10	9	12
Gasoline quality (R.v.p. 4.5):			
Research, clear	73	71	66
+3 cc.	86	84	80

Vis-breaking of high-vacuum petroleum residuum.—This would normally be expected to be very difficult because of coil coking, but the processing of this type of stock through the new radiant heater was accomplished with excellent results. Vis-breaking operations showed that fuel-oil yields could be substantially reduced over those obtained by cutback of the vacuum residuum to fuel-oil specifications. In addition, catalytic cracking feed stocks were produced resulting in increased gasoline and distillate yields. Details of the utilization of this heater for vis-breaking a high-vacuum residuum will be discussed in a paper to be presented at the Midwest regional meeting of the American Institute of Chemical Engineers at Kansas City, May 13-16, 1951.

The flexibility and degree of freedom available in controlling the shape of the time-temperature heating curve is utilized to its full advantage when vis-breaking. A straight-line time-temperature curve with no "tail" has been found suitable for this operation. Accordingly, the top row of burners on both sides of the radiant heater is shut off and the last few tubes are fired hard to hold the heating curve to a straight line, thereby preventing the heat of cracking from flattening the curve. Heat-transfer rates as high as 30,000 to 40,000 B.t.u. per sq. ft. per hour have been calculated for the last tube in the heater.

Conclusions

By way of summation, it can be said that this type of radiant-heat source gives the refiner a high-efficiency heater that is easily installed; has low maintenance and fuel costs; gives smooth operation with high wind velocities, and is capable of successfully processing a wide variety of charge stocks, due to the flexibility in controlling the shape of the time-temperature curve. This selective heat input to the radiant coils produces higher heat transfer rates than in conventional heaters, thus saving initial tube costs, reducing residence time, allowing high vapor velocities and low pressure drop.

It has not yet definitely been established that maximum conversions have been reached while processing the various charge stocks. However, the results obtained have been so impressive that several additional radiant heaters have been purchased and installed. Based on present performance, this type of radiant heater has tremendous possibilities for both the large and small refiner.

References

1. Rickerman, J. H., Transactions of the A.S.M.E., October 1945.
2. Meckler, L. A., and Van Fredersdorf, C. G., Petroleum Refiner, 26, 51-64, 1947.

The trend is toward
ASPHALT ANTI-STRIPPING ADDITIVE
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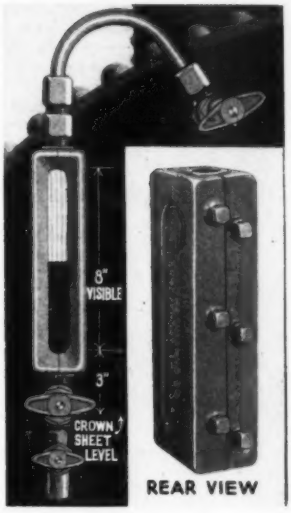

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These gauges are widely used in oil fields and refineries. One reason they are so popular is because the glasses are so easy to change.

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The glasses are extra heavy (1 inch thick as compared to the ⅝ inch thickness of the average gauge glass) and are made of a new composition that will last a long time. The patented clamp design makes it almost impossible to break a glass by tightening the clamp bolts unevenly.

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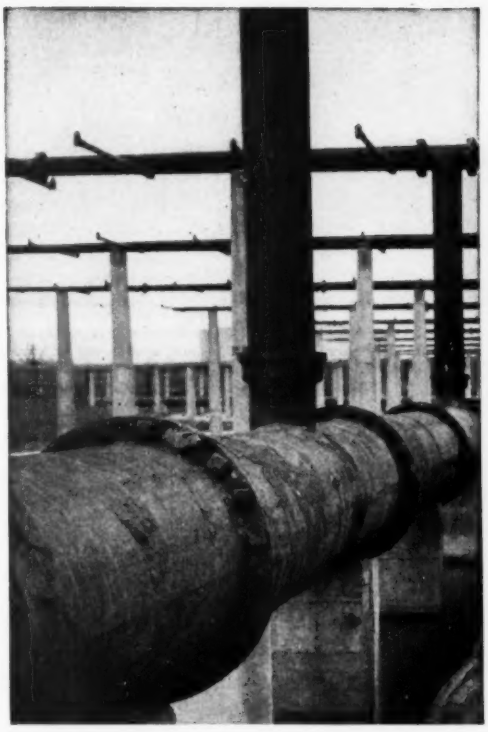

AN ECONOMY FACTOR IN REFINERY OPERATION

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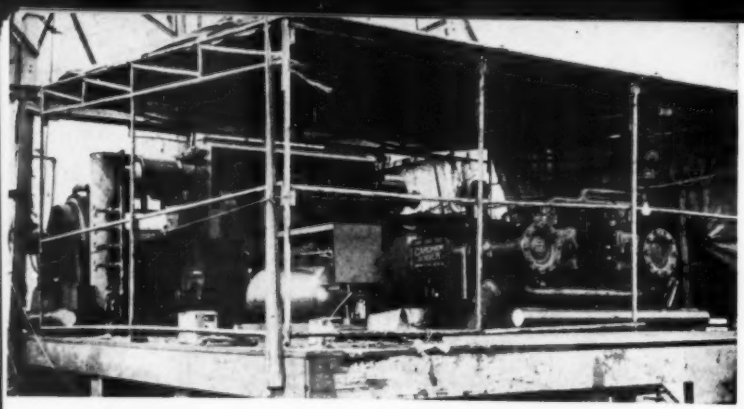
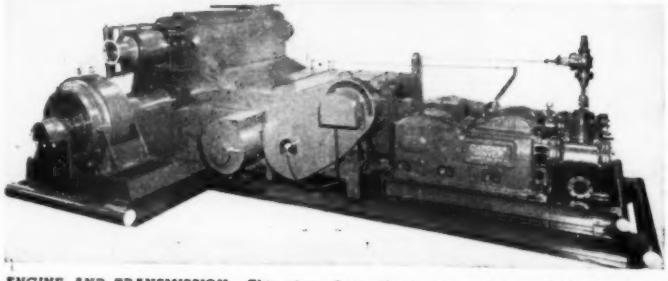


RIG BACKSIDE.—The new combination rotary-drilling rig near Ferrell, Okla., is powered by a Gardner-Denver 12 by 12-in. steam engine and is equipped with a modern air-controlled clutch and catheads and is complete with multiple speeds; addition of combustion engines and a compound makes the layout a power rig.

CONVERTIBLE RIG



ENGINE AND TRANSMISSION.—This view shows the engine and transmission section of the new combination steam and power rig with the 46-in. Hydromatic brake and the 12 by 12-in. steam engine.

An innovation in steam-rig design is a modified layout which will allow the addition of internal-combustion engines and a compound; the rig is featured by air-controlled clutch and catheads; a full-vision air-controlled panel simplifies the driller's job.

by Joseph A. Kornfeld
Mid-Continent District Editor

BOTH steam and internal-combustion engines are incorporated in a new rig now in use in southern Oklahoma. Owned by Little Nick Oil Co., of Chickasha, the rig is currently drilling a well near the town of Ferrell about 10 miles southwest of Chickasha.

The convertibility of the new rig between steam prime mover and internal-combustion motors is of unusual interest to operating personnel. It will come as a surprise to many observers to learn that a new rig design is now available for steam drillers. However, the "Titan Steam-air" rig, produced by Wilson Manufacturing Co., of Wichita Falls, can be used either as a steam rig or as a power rig; these features are made applicable in a single unit for the first time.

The innovation was designed to meet a particular problem faced by an Oklahoma oil operator who had an old steam rig in need of replacement. An ample, low-cost supply of gas and water was available at the drill site. The operator had steam boilers, pump, and accessories which would have had to be scrapped if a power rig was purchased.

WOMEN HAVE SAY-SO IN LITTLE NICK OIL CO.

A successful oil-producing company operated largely by women is Little Nick Oil Co., of Chickasha, Okla. The thirtieth year of its organization will be celebrated on July 21, 1952.

Guiding the affairs of this independent organization is Marjorie C. Nichlos, president. D. M. Cavaness is vice president. Jessie Dearing, secretary-treasurer, also serves as manager.

The rough-and-tough job of a drilling and production superintendent is always a man's job, so this task is performed by R. L. Harris.

Currently Little Nick operates two rigs in development of oil and gas in Cement and Chickasha fields of western Oklahoma.

The purchase of a complete new power rig would have necessitated the buying of a new gas engine and a large amount of other drilling equipment. On the other hand, the purchase of a conventional steam rig meant that the utility of the rig would be limited to those oil-field areas where water was plentiful and gas costs low.

Flexibility.—However, in the specially modified rig, this operator obtained a combination of equipment which could be converted readily into the latest type of air-friction clutch-drive power rig which could be used anywhere by exchanging the steam engine for internal-combustion engine and compound. Simultaneously, the operator enjoyed many advantages over those exhibited by a conventional steam rig. While a steam engine is noted for its flexibility when combined with an all-friction-clutch drive, a power rig affords the highest degree of convenience and flexibility of any type rig that can be built. This rig represents a marked improvement over the jaw-clutch-driven steam rig.

The rig is equipped with a reverse lever so that the engine may be placed in reverse if desired, but it is not necessary to use this lever to disengage the clutches as is common with many steam rigs.

Air-control panel.—The full-vision air-control panel offers advantages in that the work of the driller is greatly reduced and operations are accelerated. A high degree of safety against normal operating hazards is inherent in the design. The rig is also equipped with the new 46-in. hydromatic brake. Another feature is the latest type of dual-controlled torque cathead.

"What competition is there among major oil companies?"

Harry F. Wood, attorney of Olympia, Washington, writes: *"What type of competition does actually exist among the major oil companies? Price? Service? Research? If it's research, we should find one company's brand of oil, for example, gives better engine protection."*

Harry F. Wood

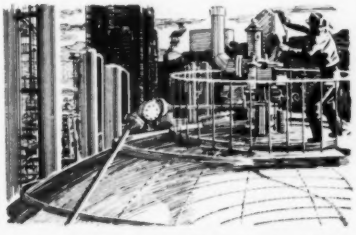
The answer to this question is much the same for the oil industry as for most others. Competition is intense in *all* operations. In oil, operations may be grouped under four broad headings...

I'd Like to Know...

You may have heard that a suit has been filed by the Antitrust Division in Washington to break up Standard of California as well as six other big oil companies which are in business on the West Coast. Already hundreds of people have written us protesting this action. Many have asked pertinent questions. We believe we should answer these questions for everyone. And we take this way of doing so. If you have a question, we urge you to write us at this address:

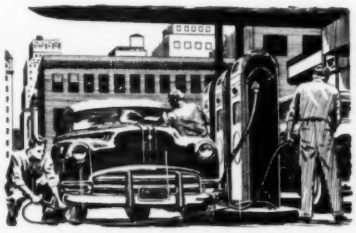
"I'd Like to Know"
225 Bush Street
San Francisco 20

Competition starts in production, getting crude out of the ground. Oil companies (both large and small) first explore, then bid for rights to land where oil may exist. Competition in efficiency then begins. Ways must be found to make wells produce at costs low enough to meet market prices.



Competition continues in refining. Again each company must make the operation pay. A plant must produce products as good as or better than those of other refiners, at prices as low as theirs or lower. No company can keep customers with products either not good enough or too expensive.

Competition in research exists indeed. That's why *two* gallons of today's gasoline, for example, do the work that took *three* a generation ago. A company must keep pace or lose out. As for differences between brands of oil: atomic energy is now being used to measure engine wear as it occurs. It reveals our new motor oil reduces wear as much as one-half, as compared with conventional oils.



And competition shows up clearly where our products are *sold*. This does, in part, take the form of *service*. (Wherever you find Chevron gasolines, you find a man making good on our promise, "We take better care of your car.") But it's also competition in *price*. To get and hold business, every seller must maintain quality in products and service, and hold his prices down to meet others.

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CORROSION and its control

Cathodic Protection Pays Off

THE decision for or against cathodic protection for a given structure must be based on the results of economic comparisons between the total operating costs of similar structures with and without cathodic protection.

Three general types of such comparisons may be made: (1) side-by-side, where similar structures exposed to similar environments are operated for comparable periods of time with and without protection; (2) off and on, where a structure which has been operated without protection and has experienced corrosion damage is operated for a subsequent period with protection and the total costs compared; and (3) fresh start, where a structure damaged by corrosion is repaired or replaced, and then subjected to the same exposure, but with cathodic protection. Great care must be experienced in making any of these comparisons, for the opportunities to be misled are many.

Case 1. Side-by-side comparison.—In a certain domestic water supply, containing 340 p.p.m. total dissolved solids, the average life of a galvanized water-heater tank is 4 years. Over a period of years the cost of keeping a heater in service will average about $20 per year. It is not known conclusively how long such a tank may be made to last by the use of a magnesium-rod anode, but certainly it could be maintained for at least 12 years. This would require the use of four anodes, since the life in such water is about 3 years. The annual cost over the entire 12 years would then be about $9.

The same study can be made in other waters, with results which are similar in principle, but differ in degree. In water of 50 p.p.m., finally, the aggressiveness has fallen off to the extent that obsolescence might well retire a heater before corrosion, even without protection. Such water, however, is present in only about 3 per cent of the heater installations in the United States. For comparison, it may be stated that the first water mentioned is found in about 12 per cent. The median water, at about 130 p.p.m., gives a tank life of 8 years without protection and an anode life of 6 years; the annual costs would then be $10 and $4.50.

Case 2. Off-and-on comparison.—A 33-mile asphalt-coated and felt-wrapped 8-in. oil pipe line experienced its first leak after being in the ground for 29 months. Five months later there was another, to be followed the next month by two more leaks. After this the leaks came at an increasing rate, until there had been 21 by the end of the fortieth month. However, during this month, cathodic protection was applied to the line, and it is now desired to make a comparison between the performance during the first 40 months and the interval following.

That this comparison is fundamentally different from the preceding one is obvious. The pipe line, after 40 months in the ground and with 21 leaks repaired, is not in the same condition as the original line, and a similar experience for the next 40 months (without protection) is certainly not to be expected. The comparison must be made between the performance with cathodic protection and an estimate of what the performance would have been without it.

Statistical theory indicates that the cumulative-leak frequency under the conditions encountered by a buried pipe line should follow a straight line when plotted on logarithmic paper. It is customary (and conservative) to plot such curves on semi-logarithmic paper instead, using a uniform scale for the time axis. The extension of the line into the future will then give the number of leaks to be anticipated.

The leak curve for the line under study is shown in Fig. 1. It will be seen that four leaks occurred during the 3 months following the installation of protection, but that no further leaks have been recorded up to a total life of 60 months. The extension of the most conservative straight line which can be drawn indicates the occurrence of leaks in excess of 1,000. This indication is probably excessive, since repair work on a large number of leaks inevitably results in the reconditioning of an appreciable portion of the line, with the effect of starting anew on those portions. Nevertheless, it is obvious that many leaks were prevented by the installation. If the number is discounted to as low a figure as 300, a comparison may be drawn as follows:

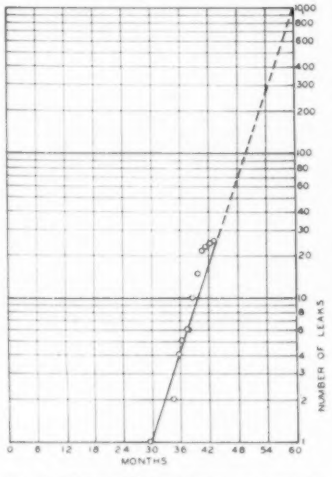

Fig. 1—Sixty-month leak-frequency curve on pipe line. Dotted extension shows anticipated leak rate if protection had not been applied.

First 40 months: 21 leaks repaired at average cost of $200 per leak; total expenditure for maintenance	$4,200
Next 20 months with protection: cost of protection,	16,000
Repair of four leaks	800
Total	$16,000
Same 20 months without protection: repair of 300 leaks	$60,000

Actually the protection system installed (distributed-magnesium anodes) should last for a total of 10 years with perhaps another $6,000 spent for maintenance. Unprotected, the line could not be expected to last 10 years without complete reconditioning or replacement.

The literature contains many such comparisons, including numerous striking examples of leak frequency curves similar[1,2] to that in Fig. 1.

Case 3. Fresh-start comparison.—A horizontal water tank, 4 ft. in diameter and 20 ft. long, is buried in soil which has not been considered, and which has not proved, corrosive. The kind of original internal coating is not known, but when the tank was 30 months old, a leak or leaks developed; the corrosion was evidently all internal. For the next 3 years, the same trouble developed at intervals of approximately 6 months, the repairs being made by field forces with little or no administrative attention to the problem. At that time a comparative study was made, by which it was determined that a good plastic lining could be installed for $400; a magnesium anode installation was made for $125, with an estimated life of 4 years. The next 4 years were entirely uneventful, and at the end of that time an inspection was made, on the basis of which the estimate of anode life was revised to a total of 6 years; no corrosion was evident.

The comparison between the first and second 4-year periods shows:

First 4 years: 7 repair jobs at $100	$700
Second 4 years: magnesium installation and one inspection	$200

If the 6-year anode life is correct, the plastic lining would have to give complete protection for 20 years to be competitive; no data are available to evaluate this comparison accurately.

References

1. A. D. Simpson, Jr., Corrosion, vol. 5, p. 59, Feb. 1949.

2. I. B. Tietze, Corrosion, vol. 5, p. 409, Dec. 1949.

Part 10 of a series by Marshall E. Parker, consulting engineer, Houston.

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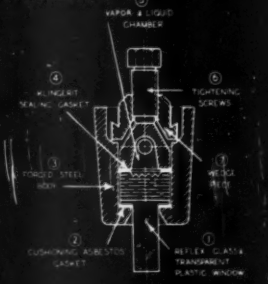

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Metals and Alloys for Refinery Services

AN excellent paper entitled "Metals and Alloys for High-Sulfur, High-Temperature Processes," was presented by Dr. B. B. Morton of International Nickel Co., before the October 1950 meeting of the Western Petroleum Refiners Association at Casper, Wyo. It is abstracted here.

Galvanic and electrochemical corrosion tends to take place where liquid water can exist. It occurs when two dissimilar metals are exposed to (or are connected by) an electrolyte, and the less-noble metal tends to go into solution at the anode whereas hydrogen gas plates out at the cathode. Oxygen acts as a depolarizer and hence the elimination of air may suppress galvanic corrosion. Paints may be used to cover or insulate the more-noble metal. Note, however, that differences of potential on the surface of a single metal may result in more corrosion than the coupling of two different metals. Thus, the noble oxide film on stainless steel can cause destruction of the metal (less-noble) if the film is locally scuffed or destroyed.

"Galvanic conditions can be employed to protect costly equipment. The use of galvanizing, also of sacrificial anodes and metals are examples. Some monel bolts in service for 22 years in salt water are representative of a noble metal protected by a less noble. The cast-iron flanges, in which the bolts were installed, suffered little increased corrosion while the bolts received nearly complete protection. The relatively small area of the bolts and the large area of the iron pipe accounts for the little increase in corrosion.

"Refluxes, cooling waters, and product handling provide conditions where electrochemical and also galvanic corrosion can occur. Due to velocity, corrosion can be quite a factor in pumps handling the materials listed above. From practical experience it has been found that Ni-Resist cast iron provides an impeller resistant to most refinery products and waters. The casings are often protected, on the inside, by special paints. Wear rings and sleeves of monel work well with Ni-Resist. In reciprocating pumps, Ni-Resist makes an excellent showing as liners, valve seats, rings, and pistons. K-Monel rods give good service in these pumps in the hardened condition."

Attack by sulfur at temperatures exceeding 500° F., is met mainly by the use of chromium—2 per cent to 9 per cent for tubes, and 12 per cent (Types 410 and 405) or 18 per cent with 8 per cent nickel (Types 302 and 304) applied as a lining or cladding for large vessels. If organic acid corrosion also occurs as with some naphthenic crude oils, the molybdenum-bearing stainless steels (Types 316 and 317) or Inconel (80 per cent Ni, 13 per cent Cr, 6 per cent iron) are preferred and note that attack on Types 304 and 410 may be more vigorous than on plain carbon steel. Naphthenic acid corrosion reaches a peak at 525-560° F.

"The tops of many bubble towers are cooler than 500° F., due to the reflux, and mineral acids such as HCL are often present. The conditions at the tops of towers are therefore unfavorable to stainless steel and wide use is made of monel to resist the mineral acids and other corrosives. The monel lining is applied to the top of the vessel; to "down comer" lines and to the vessel walls for a distance of 10-12 ft. downward. The top six or seven trays and caps are often of monel."

Nickel Also Functions Well

The dry hydrochloric acid used in isomerization units causes little trouble but at points where water enters or is concentrated for removal, Hastelloy B has been widely used as a liner and for items such as valves and fittings. Nickel also functions well if antimony chloride (the catalyst in one process) is available as an inhibitor of corrosion.

Monel metal, including the high-silicon "H" Monel, is probably the most useful alloy for resisting the hydrofloric acid used in alkylation units. However, the presence of oxygen increases the rate of corrosion, and hence corrosion may occur at leaks.

"Phosphoric acid is a tricky corrosive. In the polymerization units water condensing from the "blowback" attacked steel fittings. Lining these with monel was reported to stop the corrosion.

"The molybdenum containing stainless steels as Types 316 and 317, offer resistance to low concentrations at elevated temperatures. High concentrations of phosphoric acid at high temperatures (600°-700° F.) present a real problem. Hastelloy B and possibly C offer some hope but a non-metallic material as carbon brick seems indicated as a lining material.

"For storage of 75-85 per cent phosphoric acid at 150° F., monel appears the favored metal. In the absence of oxygen a rate of 0.005 to 0.01 in. a year might be expected. In such service severe pitting of Type 316 stainless may be expected if halogens are present (chlorides, fluorides, etc.)."

Strong sulfuric acid (95-100 per cent) as used in alkylation does not attack steel but at points of turbulence as in valves or pumps, Type 316 stainless is used and Type 304 is sometimes satisfactory. At lower concentrations (40-60 per cent) and at temperatures below 240° F., lead linings or chemical tile backed with a lead lining are necessary. The high silicon irons (Duriron, or Corrosiron) are resistant at all concentrations or temperatures and Hastelloy B though slightly less resistant has excellent mechanical properties. A Ni-Resist valve trimmed with monel is suitable for use at the bottom of conical agitators.

Monel and nickel have excellent resistance to caustic at all temperatures even up to the fusion point of concentrated caustic, but if sulfur is present and the temperature is high (500° F.) Inconel is preferred.

The chrome nickel austenitic alloys such as the excellent 28 per cent chromium 12 per cent nickel steel, are used for exposed tube hangers. Sulfur in the form of hydrogen sulfide is very destructive to heat-resisting alloys but in the form of sulfur dioxide is not seriously affected. Vanadium pentoxide deposited in the burning of certain naphthenic fuel oils is very destructive to heat resistant alloys and to many metals operating above a temperature of 1,150° F.

Aluminum Exchanger Tubes

ALCLAD tubes are now being used for at least the following petroleum industry services:

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3. Lube-oil coolers.
4. Compressor aftercoolers (natural gas).
5. Overhead condensers, Thermofor catalytic cracking.
6. Recompressor aftercoolers.
7. Hydrogen sulfide gas coolers.
8. Furfural condensers and exchangers.
9. Methyl ethyl ketone dewaxing equipment.
10. Propane chilling.
11. Wax sweaters.
12. Depropanizer overhead condensers.
13. Mono ethanol amine solution coolers or exchangers.

Alclad tubes consist of a zinc-aluminum alloy layer bonded integrally to an aluminum alloy. Their cost is less than steel, about half of that of admiralty metal, and far less than stainless steel. They are particularly resistant to sulfide corrosion, and to many brackish and salt waters containing large amounts of industrial contamination.

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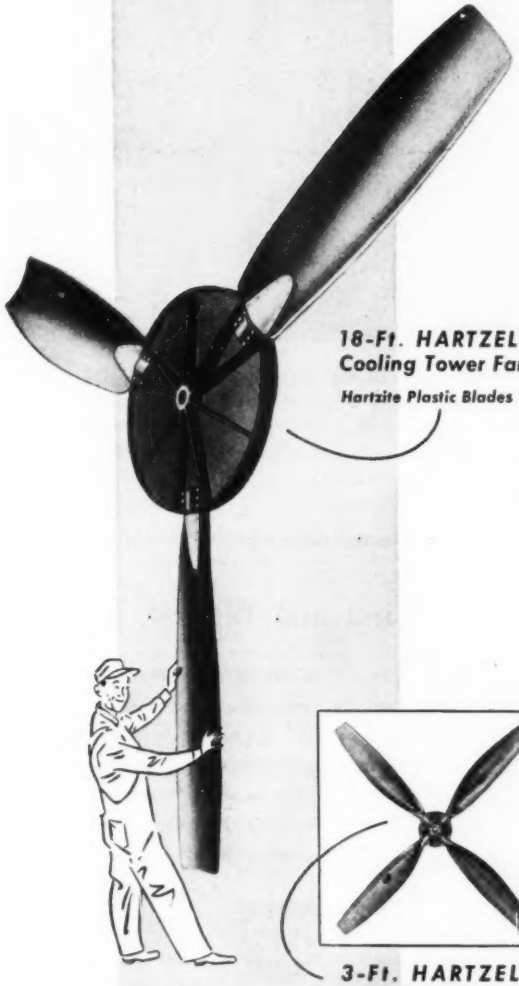

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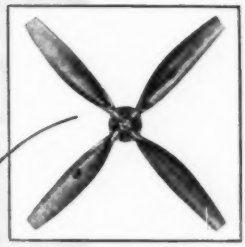
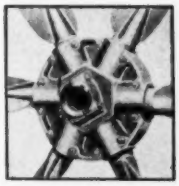


3-Ft. HARTZELL Cooling Tower Fan

Aluminum Alloy Blades

Aluminum Fan Hub



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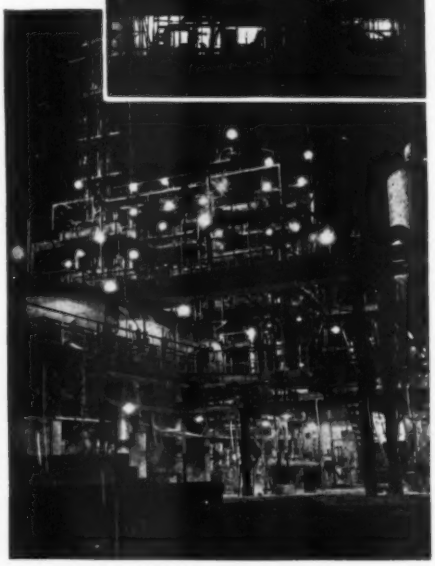

Illuminating the desert for miles around are the bright lights of Anglo-Iranian's major Middle East refinery at Abadan, largest in the world. Anglo-Iranian has refineries in eight other countries, including three in the United Kingdom, four on the continent of Europe and one in Australia. A large new refinery in England is also under construction.

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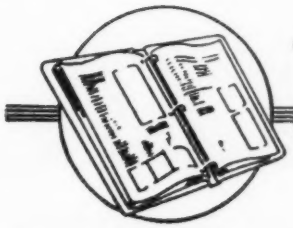

THE REFINER'S notebook

No. 70

Testing Greases*

THE more important grease tests are considered here with regards to their value in manufacturing control and their significance in connection with performance characteristics.

Penetration test.—In this "consistency" test a metal cone of standard dimensions and weight is dropped into a sample of the grease maintained at 77° F.; the distance the cone penetrates into the grease is measured. The test is often applied to a sample that has been "worked" in a standard laboratory apparatus. While working of the grease in the laboratory procedure is not comparable to the working the grease receives in an automobile wheel bearing, most marketing classifications are based on "work penetration." The N. L. G. I. (National Lubricating Grease Institute) specifies seven standard consistencies of worked penetration. The column marked "A.S.T.M. Worked Penetration" in the table below gives the reading on the dial of the A.S.T.M. standard penetrometer and is the depth (approximately) penetrated by the metal cone expressed in one-hundredths of a centimeter. The softer the consistency of the grease, the deeper the penetration.

N.L.G.I. GREASE PENETRATION TABLE

Grade number	A.S.T.M. worked penetration
0	385-355
1	340-310
2	295-265
3	250-220
4	205-175
5	160-130
6	115- 85

More than 90 per cent of the greases sold today are 1, 2, or 3 consistency.

Dropping point.—The melting or dropping point of grease is determined by heating the sample at a specified rate in a standard apparatus. The melting or dropping point is that temperature at which the first drop of liquid separates from the grease sample and drops in the apparatus. This test is of limited significance in evaluating the temperature range over which a grease is suitable for use but, here again, many conflicting factors enter into the picture. If dealing with an unknown grease, the investigator should assume that this test will not necessarily indicate the heat-stability of the grease in practical applications.

Apparent viscosity.—Since true greases do not flow under the pull of gravity, tests to evaluate their viscosity must rely on some other force to cause the flow. In one type of test the grease is passed through a standard-size orifice under rigidly controlled pressure and at carefully regulated temperatures. This device, called a pressure viscosimeter, is useful in evaluating the apparent viscosity of greases under certain conditions.

Shell roll stability.—This test is designed to evaluate the mechanical stability of grease. The apparatus consists of a hollow steel cylinder, 12 in. long and 4 in. i.d., equipped so that it can be mechanically rotated at any desired speed.

A solid-steel cylinder, somewhat smaller in diameter and shorter than the hollow cylinder, is inserted in the larger one together with a sample of grease. The apparatus is then closed at both ends and rotated at 160 r.p.m. under controlled temperature and other conditions. Rolling of the solid bar within the hollow cylinder subjects the grease to very severe working or kneading. The results of this test can be correlated with the working the grease will receive in a bearing. Change in the lubricant brought about by this severe working gives an indication of its ability to stand up under severe use in a bearing.

Oxidation stability.—From a chemical standpoint, the principal characteristic of a grease is its ability to resist oxidation and the accompanying breakdown of the lattice structure. One standard test (the Norma-Hoffman test) attempts to measure this characteristic by exposing a thin layer of grease to an atmosphere of pure oxygen and heating it to a predetermined temperature. The amount of oxygen absorbed and the way in which absorption takes place are noted and interpreted as the oxidation stability factor. At best, this test is an indication of resistance to "static" oxidation—oxidation in the original container or when applied to mechanical parts in storage. It may or may not be an indication of "dynamic" oxidation stability under working conditions. Other tests developed to assay oxidation stability have not yet been standardized and are of limited value in predicting grease performance in this respect.

Other tests.—Most textbooks on grease testing give tests for free acid and free alkali, tests for the amount of ash remaining after burning the grease, and for matter that is insoluble in various organic solvents to determine the amount of inorganic fillers such as talc, graphite, etc.

Some grease specifications include "torque tests" which measure the resistance of the grease to shearing as bearing movement begins. The Timken Load Carrying Test, also included in some specifications, is designed to give an indication of the ability of a grease to protect bearings that are heavily loaded or subjected to shock loads. Various other extreme-pressure tests have been devised and are included in certain grease specifications.

So-called "performance tests" are of particular value in assessing the lubricating ability of certain greases when used in antifriction bearings. These include tests made with the "G.E. test rig" and the "Navy test rig," and closely approximate the conditions a grease must undergo during actual use in ball and roller bearings.

Essentially, these tests that evaluate the physical characteristics of a grease are primarily useful in enabling the greasemaker to duplicate a given product from batch to batch. On the other hand, performance tests when properly interpreted give some indication of the ability of a grease to stand up and to lubricate in actual performance. At best, these test results require careful interpretation by experienced experts. To the average buyer of grease products they are of little or no value. The final and conclusive test of a grease is of course, "Does it do the lubricating job it is intended to do?"

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

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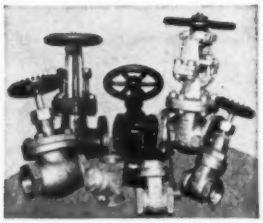

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Criteria for Determining Rock Wettability

IN many discussions of reservoir performance or of water-flooding processes the term wettability has been introduced to describe the relative roles played by the water and oil. Wettability is a rather loosely used term, and in view of the need for clarification, the intent of the present discussion will be to present some of the basic concepts and means by which relative wettability can be recognized.

A definition of absolute wettability is almost impossible to state. For this reason resort is made to "relative wettability." This term connotes the preference of a given liquid to spread over a solid surface in the presence of a second liquid. However, the preference is not always an obvious one, so the differentiation is sometimes confusing.

On a plane surface the relative wettability is expressed in terms of a contact angle. For example, in Fig. 1, liquid A has a relative wettability for the solid surface because the contact angle so indicates a preference. However, in some instances the situation with these same liquids and solid might be reversed so that the angle would indicate that liquid B has a relative wettability for the solid surface. This may happen because liquid B was placed in contact with the surface prior to liquid A. Therefore, contact angle itself is not too good a criterion.

Within a porous solid which has different types of solid surfaces and many shapes of pores the problem of relative wettability becomes even more complex and it would probably be too much to hope that the relative wettability could be stated in terms of a single contact angle even if such an angle could be measured. In spite of the complexity it is possible by some performance tests to state what the preferential wettability is.

One of the earliest criteria used for indicating relative wettability was the threshold pressure test, which is a determination of the displacement pressure as given on a capillary-pressure curve. This test is not, however, a positive test. Although an imbibition of the displacing fluid indicates relative wettability by the displacing phase, lack of imbibition does not indicate nonwetting by the displacing phase.

This can be explained more fully in terms of an entire capillary pressure sequence of drainage followed by imbibition. Welge[1] has shown that a pressure may be necessary to enable the fluid which preferentially wets to displace the nonwetting phase. It has further been shown by experiment[2] that a positive pressure is more apt to be required if there is none of the wetting phase present within the core to begin with. Fig. 2 is a schematic representation of these ideas.

The entire capillary pressure sequence rather than the determination of a single displacement pressure should be used therefore as a criterion of wettability. As a substitute for a complete drainage-imbibition cycle, two separate capillary pressure curves can be attempted, the first to displace oil by water and the second water by oil. The fluid which preferentially wets can be determined by comparing these capillary pressure curves.

Another criterion for relative wettability is the relative-permeability curve. Inasmuch as the wetting phase flows in the region next to the rock surface, or in the finer channels, it is to be expected that the relative permeability should be lower than that for the nonwetting phase at a given saturation. Although this is not always true, the rate of increase of relative permeability with saturation seems to be less for the wetting phase than for the nonwetting phase. The typical difference in the two curves is illustrated schematically in Fig. 3.

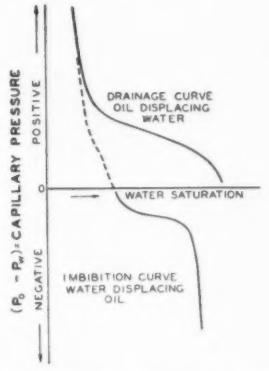

Fig. 2—Schematic representation showing relative variations of capillary displacement by wetting or nonwetting phases. (System is relatively water wet.)

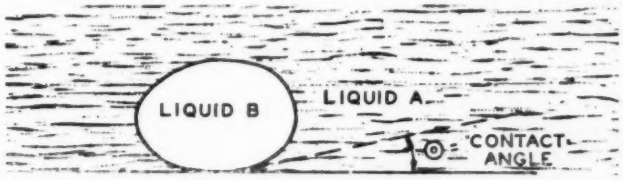

Fig. 1—Schematic representation of relative wettability as indicated by contact angle.

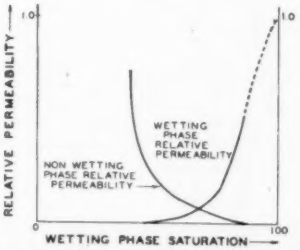

Fig. 3—Schematic diagram showing relative change in curves for wetting and nonwetting phases.

References

1. Welge, Displacement of Oil From Porous Media by Water or Gas, A.I.M.E. Trans., Vol. 179, 1949.
2. Kinney, Wettability Studies, presented at fourteenth annual tech. meeting, M. I. Exp. Sta., State College, Pa., Nov. 1950.

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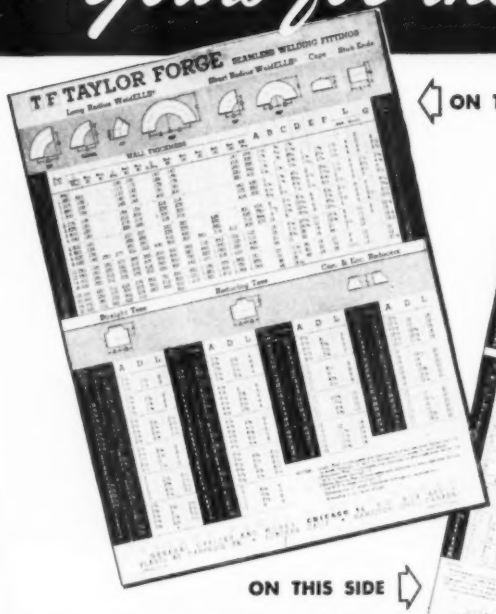
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1 FUEL SAVER. The economic advantages, industrial applications, and refractory properties of insulating fire brick are described in a new four-page illustrated folder. The folder also contains summarized information on accessory materials and other insulating brick. *Johns-Manville.*

2 TUBING HEAD. Bulletin 374 illustrates features and operation of a new Type "E" tubing head (2,000 psi. working pressure) for flowing and pumping wells. *The National Supply Co.*

3 TENSION LINKAGE. Bulletin 51-10 is an informative handbook for designers of tension linkages. Various types of roller chains used in applications are illustrated, described, and cataloged.—*Chain Belt Co.*

4 POLARIZED FIELD FREQUENCY SYNCHRONOUS MOTOR CONTROLS are illustrated and described in detail in an eight-page, two-color brochure. Also included are ratings, weights, dimension drawings, and specifications for each type of control covered. *Electric Machinery Mfg. Co.*

5 FILM-TYPE HEAT EXCHANGERS. Bulletin HE-7 explains outstanding advantages and applications of this exchanger. Also describes a number of different designs for major components. Construction of water-distributing ferrule is detailed. *Henry Vogt Machine Co.*

6 BOILER FEED-WATER CONTROL. Bulletin 489 illustrates and describes three different types of boiler feed-control systems at the Yates, Atkinson, and Arkwright plants of Georgia Power Co. *Continental Foundry & Machine Co.*

7 TUBE-SUPPORTED WALLS. A new 12-page, 2-color catalog explains in detail how Bigelow-Liptak walls may be suspended directly from boiler tubes with savings in steel and erection time. Engineering drawings show typical jobs and describe how the enclosure is fastened to the boiler tubes. *Bigelow-Liptak.*

8 SHEAR-SEAL VALVES. Catalog 1B-1 covers the entire range of shutoff, selector, and manipulator valves for pressures from 0 to 6,000 psi., and contains explanatory copy and illustrations. Included is a simple outline for determining proper valve size with tables giving steel pipe data and capacities of hydraulic rams. *Barksdale Valves.*

9 VAPE-SORBER is a four-page bulletin explaining the continuous removal of petroleum vapor from compressed air and other gases used for instruments or critical pneumatic operations. *Selas Corp. of America.*

10 STEAM TURBINES is a concise booklet describing and giving technical data for the vertical-drive steam turbine. This type drive is built in three general sizes, 14-in. rotor BTV, 24-in. rotor BKV, and 36-in. rotor BEV handling industrial applications up to 600 hp. with thrust loads of 8,000 lb. or more and steam conditions as high as 900 psig. and

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900° F. total temperature. *Whiton Machine Co.*

11 **NEOLAC 600.** Bulletin 239 describes an air-dry enamel built around C-34, a new resin with unusual film-forming properties. It is made to bond tightly to wood, metal, or concrete without the necessity of a prime coat. *Chamberlain Engineering Corp.*

12 **HYDROGEN ZEOLITE WATER SOFTENERS.** Publication 4530 is a 16-page bulletin which gives complete process description, field application, and advantage of hydrogen zeolite softening and its relation to the sodium zeolite softening process. *Cochrane Corp.*

13 **FLOWING POWER** is a brochure in color with illustrations and installation data on Johnston oil-lubricated and water-lubricated propeller pumps. Also included is a performance table for smaller pump sizes. *Johnston Pump Co.*

14 **CAST MONEL.** An eight-page booklet contains valuable information concerning production of cast Monel and its use in the handling of acids and alkalies. Also included are detailed charts showing corrosion resistance to various materials. *Cooper Alloy Foundry Co.*

15 **GROUND TESTING INSTRUMENTS.** A new data sheet is now available on Vibroground Model 243 lightweight soil-resistivity tester, and Model 263, designed for testing soil, circuit, and anode resistance. *Associated Research, Inc.*

16 **CORROSION-RESISTANT FITTINGS.** an eight-page booklet, describes new low-cost fittings for which patents are pending. It also shows how light-walled corrosion-resistant piping reduces the cost of piping layout. *Potts Co.*

17 **VISCORATOR INSTRUMENTS.** Catalog 88 describes and illustrates Viscorator instruments which provide a quick method of determining viscosity values for industrial processes. *Fischer & Porter Co.*

18 **INDUSTRIAL AND MARINE HARDWARE** is a new, revised, and enlarged data book which combines valuable engineering information with a complete line of wire rope and chain fittings. Also included are data tables and charts. *Thomas Laughlin Co.*

19 **THERMO-REGULATORS AND THERMOSTATS** is a 12-page catalog illustrated with photographs and cutaway drawings to aid engineers and technicians in selecting suitable equipment for temperature-control work. *H. B. Instrument Co.*

20 **NEEDLE VALVES.** A four-page folder is available describing the Kerotest line of forged steel, union bonnet needle valves for high pressures and corrosive services. A complete price list is included. *Kerotest Manufacturing Co.*

21 **ALLIS-CHALMERS' ANNUAL REVIEW.** This comprehensive, extensively illustrated booklet gives a resume of engineering developments in all types of A-C industrial machinery for the year 1950. It is a useful reference book as well as a guide in the pattern of industrial progress. *Allis-Chalmers Manufacturing Co.*

22 **LOAD CELLS.** Bulletin 324 describes, illustrates, and gives specifications for a new line of seven Type U-1 SR-4 universal load cells ranging in weighing capacities from 500 to 50,000 lb. in tension and compression. *Baldwin - Lima - Hamilton Corp.*

23 **"O" RING DATA.** An informative notebook is now available for users of "O" ring seals in which basic design data are provided for the proper determination of ring sizes, permissible squeeze, groove tolerance, and other critical machining dimensions. The use of antiextrusion devices or backup rings for high pressures is explained. *Rubber Products Co.*

24 **NEW VALVE CATALOG.** A 44-page, illustrated catalog describes many standard models and modifications of valves, including straightway, three-way, four-way, and four-way five-port units in various sizes of hand, foot, solenoid, pilot, remote control, cam, speed control, shut-off, and quick exhaust valves. Detailed descriptions are given together with sectional views, installation data, and diagrams. *Ross Operating Valve Co.*

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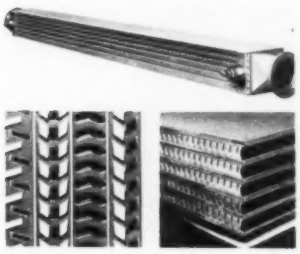
by Dan B. Miller

25 NEW SOLVENT-RECOVERY UNIT is a new plate-type heat exchanger especially designed for solvent recovery. Incorporating interlocked channel-type fins with special embossings or interrupted surfaces, it provides unusually high concentration of surface for low weight and volume. Surface area ranges from 250 to 300 sq. ft. per cubic foot, permitting substantial cost savings over conventional heat exchangers used for solvent recovery. Units are designed for easy assembly into blocks to accommodate a wide range of capacity requirements. *Modine Manufacturing Co.*



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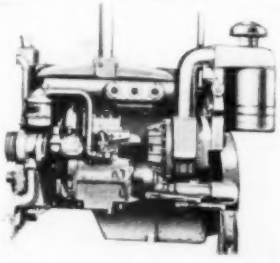
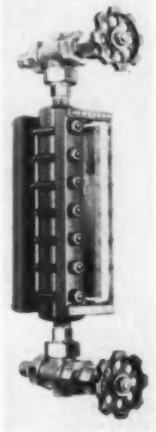
26 NEW INDUSTRIAL DIESEL ENGINES. A new feature on the two models D337 and D326 is the fuel system with fuel pumps mounted adjacent to the cylinders they serve. This results in standard, identical, short fuel lines for each cylinder. The pistons, which have an iron band cast integrally for the upper ring, are cooled by an oil stream sprayed from a nozzle that is solidly attached to the engine block. Since this spray lubricates the piston pin, as well as cooling the piston, oil grooves are not required in the connecting rod. Fine filtration elements handle the full flow of oil to the engine system. Oil passageways are protected from dirt and foreign material falling into them while filter elements are being changed. Any sludge will collect at the bottom of the cams where it cannot possibly enter the oil passageways or relief valves. *Caterpillar Tractor Co.*

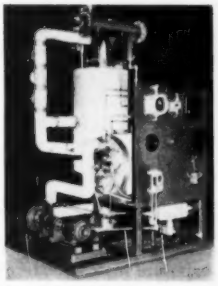




27 NONFROSTING LARGE CHAMBER GAGE, includes patented gage glass extension, which prevents frost from forming over the vision slot; thereby permitting quick, accurate level reading of low-temperature and low-boiling-point liquids. It is particularly adapted to the gaging of low-temperature, light, gaseous fluids that tend to boil or surge because of the larger area at the meniscus. The frosting over of the vision slot is eliminated by the patented frost-preventing unit, extending from the gage glass. Its use in the petroleum and other process industries, for low-temperature ammonia, freon, propane, and ethylene, will materially increase the accuracy of readings. In installation, the entire gage may be covered with insulation, leaving only the outer surfaces of the window extension exposed. *Jerguson Gage & Valve Co.*

IT'S NEW ✓ CHECK IT

28 ELECTRICALLY HEATED DOWTHERM HEAT-TRANSFER UNITS. With capacities ranging from 100,000 to 500,000 B.t.u. per hour, these heaters have a temperature range to about 750 F. using Dowtherm as a liquid or vapor medium. Other heat-transfer fluids may be utilized in this equipment. The entire unit may be base mounted at the factory or supplied with all essential equipment for individual mounting. Units include a special heating element, designed to eliminate thermal breakdown or coking troubles. *Struthers Wells Corp.*



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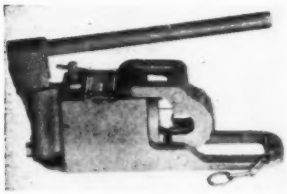

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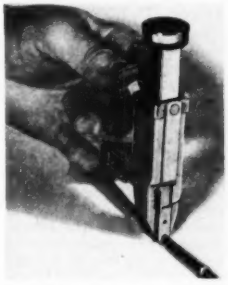

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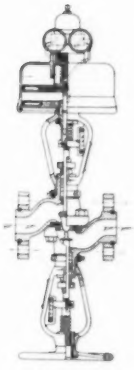
31 NEW COMBINATION AUTOMATIC AND MANUAL CONTROL VALVE. The combination valve uses the Annin Domotor operator with its powerful direct-acting piston mechanism as the control valve. An Annin Fig. 15 handwheel valve is mounted on the under side of the single seated valve body which made this unique design possible. When automatic control is desired the handwheel valve is opened fully, causing no complications. During startups or instrument repair periods the handwheel provides positive manual control without changing valves. The handwheel may also be used as an adjustable limit stop for the automatic control-valve plug. Pressures up to 3,000 psi. and temperatures of 1,000° F. can be handled without difficulty. *Annin Valve Co.*



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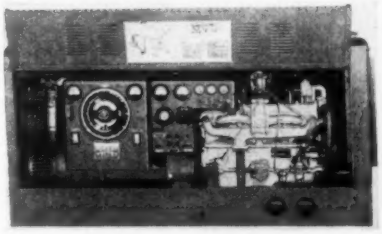
32 300-AMP. GASOLINE-ENGINE-DRIVEN ARC WELDER with 3-kw. auxiliary power generator is a self-contained unit, powered by six-cylinder self-starting Chrysler industrial engine directly connected to the welding generator and mounted on a welded steel frame. The auxiliary generator provides for lights and such tools as a lathe, grinders, drills, chipping hammers; power wrenches, and paint sprayers. The unit is completely enclosed by a sheet-metal canopy that is bolted directly to the frame. Hinged side doors provide access to control panels, engine, welding generator, and other parts within the canopy. The welding generator is rated at 40 volts, 300 amp. under 1-hour resistance load at 1,500 r.p.m. and has a current range from 50 to 400 amp. Cooling is accomplished by a large squirrel-cage-type fan which draws cool air in at both ends of the generator and expels the heated air at the center. Controls and instruments are all conveniently located on the right or carburetor side of the unit and are mounted on the welding generator control panel and the engine control panel. *Hobart Brothers Co.*



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33 ROLATAPE MEASURING WHEEL. Model 400 Rolatape, a measuring wheel which is exactly 4 ft. in circumference and registers distances up to 100,000 ft., then repeats cycle, accurately measures and records as it is wheeled over course. It is being used in oil-industry applications such as physical inventories, geophysical exploration, lease work, measurement and location of bulldozed roads, gathering lines, communications, pipe laying, and general estimating work. It measures around corners and over contours, with equal facility and accuracy. It weighs 5 lb. and is easily and efficiently operated by one man. Counter is in plain view at all times. The handle folds compactly so wheel can be easily carried and stored in car or truck compartment. Can also be operated by the driver of a car as he drives slowly over course to be measured. *Rolatape, Inc.*

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34 NEW TYPE VLT PUMP for general industrial applications, incorporates a BJ mechanical seal, which is suited for the handling of petroleum products generally. It is a small, standard, vertical pump, furnished with pipe tap suction and discharge nozzles, type U mechanical seal, and standard material. It is built in 1-bbl. size, in which either an open or closed impeller bowl assembly can be installed. By omitting the barrel, the unit is ideal for sump or tank pump service. The barrel is constructed of 6-in. standard pipe, flanged at the top for connection to the nozzle head. A motor flange is provided to receive solid-shaft motors from 1½ to 10 hp. inclusive at 3,550 r.p.m. An adjustable flanged-type coupling is supplied to permit easy and accurate lateral adjustment of impellers. *Byron Jackson Co.*

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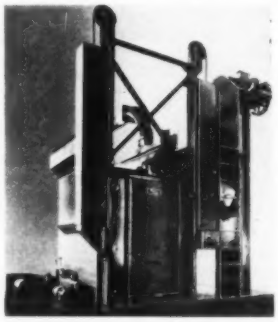
35 GAGE VALVE has male inlet and female outlet in the ½-in. size. The new gage valve requires no nipples when hooking up pressure gages to pressure tubing or casing because the male inlet basically serves the same purpose as a nipple. The male inlet is an integral part of the forged steel valve body offering greater strength and soundness. Wall thickness of the inlet is extra heavy for high pressures and provides greater protection against breaking off or rupturing. The new gage valve also features a safety taper threaded joint between the body and bonnet which prevents the bonnet from backing out of the valve due to vibration. *Edward Valves, Inc.*

IT'S NEW CHECK IT

36 ROTOBLAST DRUM-CLEANING MACHINES. Model ES-400 simplifies and speeds up the removal of dirt, rust, paint, and other foreign materials from 30 and 55-gal. returnable steel drums and lids before reuse. Metal abrasive, hurled against interior and exterior surfaces by centrifugal force, scours the metal leaving no chemicals or alkalies to wash off, and providing a clean bonding surface for repainting. Drums are automatically handled during the cleaning operation. One man is required to load and unload the barrels. Model ES-400 is designed to clean 1,000 to 1,100 drums and drum heads a day, or 125 to 140 per hour. Cleaning cycle takes from 50 to 90 seconds depending upon the nature of the material to be removed, and the facility with which the operator loads and unloads the drums. Spent abrasive, mixed with the material it has scoured from the drum, is cleaned of all dirt and broken particles by a separator and returned to the machine for reuse. To prevent the possibility of accidents, automatic shutoff valves on both machines prevent any flow of abrasive when the partitions or doors are open. *Pangborn Corp.*



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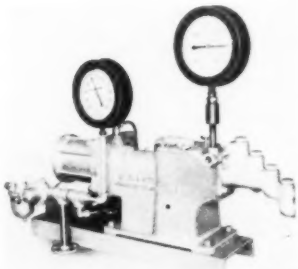
37 AIROYMETRIC PRESSURE GENERATOR. The unit is combined with a group of specially designed simplified controls to develop test pressures up to 25,000 psi. using ordinary plant air supply in the pump cylinder. Each of the pumps develop a discharge pressure ratio range of at least 6 to 1, permitting single pump use for applications requiring various test pressures. Individual units may be custom made for specific applications between 25 and 25,000 psi. It has use in the hydrostatic testing of boilers, forgings, castings, tubing, pipes and piping systems, pressure gages, valves, vacuum pumps, dryers, and high-pressure hose, among others. It is self-reciprocating, and in operation pumps continuously and automatically at maximum capacity in building up the desired pressure in the system. When a balance is reached between the air pressure and the corresponding hydrostatic test pressure the pump automatically stops. *Milton Roy Co.*



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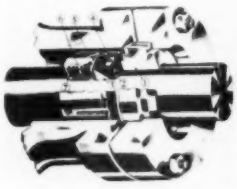
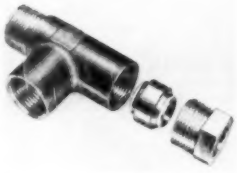
38 TYPE 9 MECHANICAL SHAFT SEAL performs effectively under severe temperature and corrosive conditions. It incorporates a flexible ring molded from Teflon. The Teflon wedge ring enables this seal to combine the chemically inert properties of Teflon with the flexibility and positive sealing components essential to effective mechanical sealing. The set-screwed metal retainer (7) provides a positive drive from shaft to carbon sealing washer (2) through dents (4) which fit into washer notches. Seal between the shaft and washer is insured by the precision machined Teflon wedge ring (3) which is preloaded by the action of multiple springs (6). Spring pressure is uniformly distributed by a metal disk (5). The lapped raised face of the rotating sealing washer (2) mates against the lapped face of the stationary seat (1) to provide a positive leakproof seal with minimum running friction between vertical faces. Spring pressure keeps the faces in constant contact providing automatic adjustment for wear and shaft end play. *Crane Packing Co.*



IT'S NEW CHECK IT

39 STAINLESS STEEL FITTINGS. A complete, new selection of stainless-steel tube fittings designed to meet unusual piping conditions permits different sizes of tubing, or tube-pipe combinations, to be joined in a single fitting. This feature completely eliminates the need for supplementary reducing couplings at which line leaks might occur. In addition, installation costs are held to a minimum because one fitting does the work of two or three. Illustrated is a Koncentrik tee equipped with a 1-in. tube, a 1-in. female pipe, and a ¾-in. male pipe connection. New selection of stainless-steel connectors, unions, tees and elbows incorporates the patented, automatically self-centering seat which provides a perfect, wedge-type seal, even though tube is assembled off center. Another exclusive superiority is the reinforcing Teflon rings that double-seal the seat to further guard against losses. *Special Screw Products Co.*



NATURAL GAS

Eastern Expansion

New York State Natural plans $33,000,000 outlay

PITTSBURGH. — New York State Natural Gas Corp. has laid the groundwork for a natural-gas-transmission and storage program during 1951 that is expected to cost $33,000,000.

A major portion of the outlay, about $20,000,000, will be allotted to development of the huge Oakford underground-storage project in Pennsylvania. Work on other underground-storage projects is progressing at the South Bend pool in Armstrong and Indiana counties, and the Sabinsville pool in the Sabinsville, Pa., area.

Transmission.—In the planning stage is a 164-mile, 20 and 16-in. transmission line from Ithaca to Albany, N. Y. The line would serve Utica, Mohawk, Herkimer, Canajoharie, Amsterdam, Schenectady, Albany, and Troy. Gas would be sold to Niagara Mohawk Power Corp. for resale. New York State Electric & Gas Corp. also will have a connection with the line at Deruyter. Cost is estimated in excess of $13,000,000.

The company also plans construction of a 39-mile, 20-in. loop line from its State Line compressor station in Potter County, Pennsylvania, to Rossburg in Wyoming County. It would parallel an existing line to a point near Rochester, N. Y. This construction will eventually bring up daily deliverability from 75 to 177 million cubic feet per day.

Another loop, from near New Kensington, Pa., 51 miles to Petersburg measuring station on the Ohio line, will be built to parallel the existing Youngstown line built last year. Also from the New Kensington area the company will build a 26-mile, 20-in. line to the South Bend pool.

Other transmission projects in Pennsylvania include completion of approximately 54.5 miles of loop line from Tonkin station to Preston station. Twenty-seven miles of the line was finished last year.

Grading work has started at the site of a $7,500,000 compressor station in the Oakford area near Jeannette, Pa.

Texas House Passes Gas Bill

AUSTIN.—The Texas House of Representatives last week passed by a vote of 72 to 43 a bill giving the Texas Railroad Commission the right to fix minimum prices for all natural gas produced in the state, where such action is in the interest of conservation.

The house earlier rejected an amendment offered by Rep. William A. Miller, Jr., of Houston, which would have excluded existing price agreements. Backers of the bill contended that the commission must be given price-fixing powers or the Federal Power Commission would take over this authority.

Action on the measure by the Texas Senate is expected this week. The legislative session is scheduled to adjourn May 8, but is expected to run overtime.

One of the strongest opponents of the bill is Lone Star Gas Co. of Dallas. Chester L. May, vice president of the company, said passage of the measure would mean a $97,000,000 annual increase in residential, commercial, and industrial gas rates.

Meanwhile, the senate committee on state affairs approved the omnibus tax bill which includes a provision to hike the natural-gas levy by 20 per cent (a 1 cent per M.c.f. raise). This bill also is expected to be acted on by the Senate this week.

San Juan Play Growing

DENVER. — Frontier Refining Co. plans to start this month a seven-well drilling program for development of acreage in the West Kutz Canyon area in San Juan County, northwestern New Mexico, thus adding another company to those now participating in the heavy gas play in the basin.

During February 1951 Frontier concluded a contract with the Oklahoma Oil Co. of Denver, whereby Frontier acquired full operating rights on two blocks totaling 7,974 acres in the West Kutz Canyon area in return for payment of a cash consideration and a net profit assignment to Oklahoma Oil.

Ben H. Parker, vice president for Frontier, said that development of the acreage will continue as rapidly as market and other conditions warrant, and that initial operations will be started on the 4,480-acre eastern block acquired from Oklahoma. Gas production will be sought in the Pictured Cliffs sandstone expected at about 2,000 ft.

Gas produced from this general area is now being purchased by Southern Union Gas Co. and is distributed through Southern's transmission and distribution systems in northern and central New Mexico.

El Paso Natural Gas Co.'s major natural - gas - transmission line being built from the basin to connect at Topock, Ariz., with the Pacific Gas & Electric Co. is expected to step up drilling development to supply an annual demand of 50 billion cubic feet.

The impetus to development in the San Juan Basin is reflected in current drilling activity in the Kutz Canyon area where 11 rigs are active. Companies now participating in developing the Pictured Cliffs reservoir include Stanolind Oil & Gas Co., Byrd-Frost, Inc., Mac T. Anderson, James T. Hancock, Frontier, and others.

Development was stimulated by a completion made last year by James T. Hancock at 1 Douthi-Federal, NW NE NW 26-27n-11w. The well was drilled originally to a total depth of 6,850 ft. in barren Dakota sandstone, then was plugged back to 2,110 ft. and completed for a gage of 5,040 M.c.f. of gas daily from the Pictured Cliffs zone.

February Sales Reported

NEW YORK.—Sales of natural gas during February totaled 4,533 million therms, according to the American Gas Association. This is 21.5 per cent over the 3,732 therms sold in February 1950, but a decrease of 210 million therms or slightly less than 4.5 per cent from the all-time high of 4,743 set in January 1951.

For the 12 months ended February 28, 1951, sales totaled 40,174 million therms, an increase of 20.4 per cent over the same period a year ago.

Natural Gasoline

L.P.G. Injection Results

CORPUS CHRISTI.—Results of the first year's operation of La Gloria Corp.'s new N-butane storage project near here were described as satisfactory by operators last week. *(The Oil and Gas Journal, May 3, page 143).*

La Gloria Corp. engineers noted that the first butane reproduced was uncontaminated. They observed that the amount of methane in the butane increased to approximately 2 per cent, and that iso-pentanes plus increased to 2½ per cent with reproduction of 62 per cent of the butane injected.

Operators believe that they now could store the equivalent volume of butane in this reservoir and that it would be uncontaminated when reproduced.

During the summer season of 1950, La Gloria Corp. stored 727,000 gal. in the 5,500-ft. Frio sand. During the following winter season, they produced 448,000 gal., or 62 per cent of the material stored.

Statistics on the injection reservoir were revealed last week as follows:

PHYSICAL FACTORS
Frio Sand Injection Reservoir, La Gloria Field, Jim Wells County, Texas

Average porosity, per cent	20.0
Average permeability, md.	136.0
Average connate water, per cent of porespace	20.0
Depth to edgewater, ft.	5,575
Present reservoir pressure, psig.	1,800
Average reservoir temperature, F.	177

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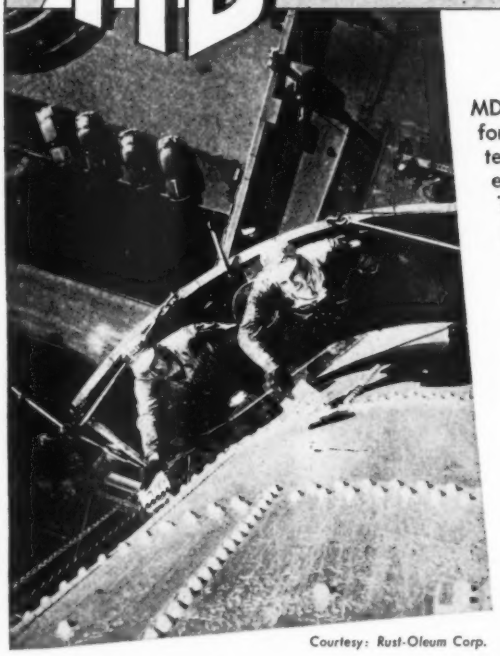

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REFINING

Atlantic Plans Expansion

NEW YORK.—Plans for a major expansion of its Philadelphia refinery have been disclosed by Atlantic Refining Co.

Facilities to be added include a 50,000-bbl. daily two-phase distillation unit, a new fluid catalytic cracking unit, and additional alkylation and polymerization equipment.

Atlantic's Philadelphia refinery now has a crude charge capacity of 117,000 bbl. daily with 28,000-bbl. thermal cracking capacity per day, including reforming, and 30,000-bbl. fluid catalytic cracking capacity per day. When the new distillation equipment is placed in operation, about 22,000 bbl. daily of old crude-processing facilities will be retired from service, thus providing a net increase in refinery capacity of 28,000 bbl. daily to a new total of 145,000 bbl. daily.

Process design and engineering work on the program is now under way, and construction is scheduled to commence as soon as possible.

New Sohio Distillation Plant

CLEVELAND.—Standard Oil Co. (Ohio) has begun construction of two distillation units at its No. 1 refinery here. The new units together will process about 50,000 bbl. of crude oil per day.

Construction of the units will cost about $5,500,000 and is scheduled for completion in March 1952. Products will include jet-plane fuel, diesel fuel, high-octane gasoline, and asphalt. The new facilities mark the second step in the expansion and improvement program for the refinery. The company earlier this year completed a $4,000,000 catalytic cracking plant that adds 252,000 gal. daily to the refinery's output of high-octane gasoline.

The distillation plant will occupy an area 272 by 350 ft. and the towers in each unit will be 150 ft. high. Construction will require 4,900 cu. yd. of concrete and 4,000 tons of steel. This compares with 2,000 cu. yd. of concrete and 2,300 tons of steel required to construct Sohio's cat cracker completed at Lima, Ohio, last year. General contractor is Arthur G. McKee Co., of Cleveland.

German Synthetics Report

WASHINGTON.—The development of synthetic lubricant oils by Germany's I. G. Farben is reviewed in a new report now obtainable from the Office of Technical Services of the U. S. Department of Commerce.

The report, prepared by the Defense Department's Central Air Documents Office, is a description of studies in this field carried on by I. G. Farben's Division of High Pressure Experiments, beginning as early as 1924, and culminating in the developments made during World War II.

Included in the report are a de-

GROUND BREAKING.—E. B. McConnell, vice president in charge of manufacturing for Standard Oil Co. (Ohio), turns the first shovel of earth at official ground-breaking ceremonies held preparatory to commencing construction of Sohio's two new crude-distillation units at its Cleveland refinery, each of which will be capable of processing 25,000 bbl. per day. Left to right, attending officials are: J. R. Cuthbert, manager of Sohio's No. 1 refinery; Clyde T. Foster, president of Sohio; McConnell; and James Diemert, union representative.

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scription of the chlorine method of lubricant-oil synthesis, giving the per cent yields of various oils; a discussion of the paraflow synthesis and its application to lubricant oils with solidification points of from —10 to —30 C.; and a review of the synthesis of lubricant oils from propylene by polymerization with aluminum chloride. The properties of propylene oils are given, as well as the results of engine tests.

PB 101 870, "Studies on Synthetic Lubricant Oils," 12 pages including tables, can be obtained for 50 cents from the Office of Technical Services, Department of Commerce, Washington 25, D. C.

W.P.C. Refining Papers

Advances in petroleum-refining operations and developments in improving petroleum products will be discussed at the third World Petroleum Congress to be held at The Hague, the Netherlands, May 28-June 6 under several major divisions. Papers on these subjects, all to be distributed in preprint form at the sessions, include:

Physical operations in oil processing.—"Use of Extraction Processes in the Manufacture of Lubricating Oils," E. J. Dawson, U. K.; "Hypersorption Process for Gas Fractionation," Clyde Berg, U. S. A.; "Hydrogen Fluoride Extraction of Sulfur Compounds and High Sulfur Petroleum Stocks," A. P. Lien, D. A. McCauley, and B. L. Evering, U. S. A.; "A New Efficient Extraction Apparatus—The Rotating Disk Contactor," G. H. Reman, the Netherlands; "Furfural Extraction of Middle Distillates," W. P. Gee, H. H. Gross, and W. E. Skelton, U. S. A.; "Extractive Distillation," John M. Chambers, U. S. A.; "Extraction et Purification des Hydrocarbures Aromatiques par Distillation Azeotropique," V. Berti and T. Bottiglia, Italy.

Oil processes involving chemical conversions.—"Mechanism Studies on Fischer-Tropsch Synthesis," Paul H. Emmett and J. T. Kummer, U. S. A.; "Recent Progress in the Hydrogenation of Petroleum Oil," M. Pier, Germany; "Contribution of the Houdry Catalytic Cracking Processes to Petroleum Refining," W. F. Faragher, H. D. Noll, and R. G. Bland, U. S. A.; "Catalytic Cracking and Reforming Processes for Increasing the Yields and Octane Number of Gasoline," S. D. Dalton and T. P. Simpson, U. S. A.; "Preparation Semi-Industrielle d'Essences d'Aviation Aromatiques," Alain Guillemin, France; "Polymerization With Solid Phosphoric Acid Catalyst," Gustav Egloff and P. C. Weinert, U. S. A.; "Fluid Hydroforming," E. V. Murphree, U. S. A.; "Gasoline Sweetening Operations at Palembang Refinery," E. C. Campioni and J. P. Cordia, Indonesia.

Refining Briefs

Socony-Vacuum Oil Co., Inc., has completed the enlargement of its bead-catalyst plant at the Paulsboro, N. J., refinery. The expansion included modification of flumes to handle enlarged capacity, installation of four new 35,000-gal. wash tanks, and addition to a new tempering kiln capable of treating 75 tons per day.

Basic materials of the beads are sodium silicate and aluminum sulfate. The material forms in beads in an oil bath, which are then sluiced in water, dried, and sent to the tempering kiln for finishing.

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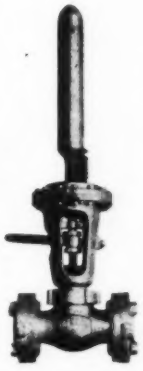
(1.) The first valve in this Assembly operates the Feed Water Level Control Valve (at right), which starts and stops the feed water pump. (2.) If something happens to the pump or to the water supply, and the water drops one inch in the boiler, a shrill whistle is sounded to warn the fireman. (See top of Alarm, above).



(3.) If no attention is paid to the whistle, and the water drops another inch in the boiler, the third valve of the assembly activates the Fuel Cut-Off Valve (at left), which cuts the fire under the boiler. When this valve is once cut off, it cannot accidentally come back on, but must be reset open by hand.

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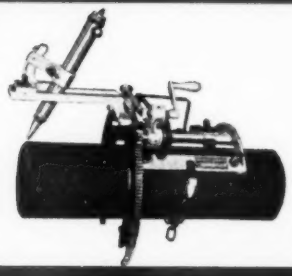
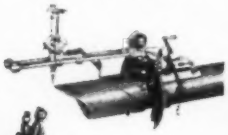


ATTACHMENTS



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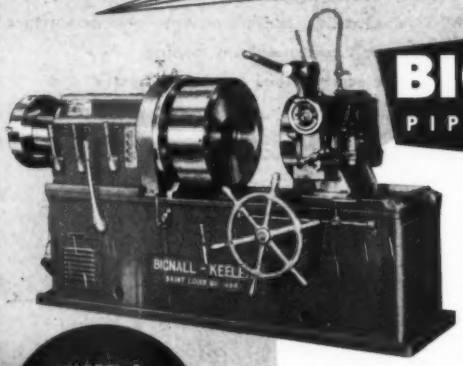

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PIPE LINES

Service Plans Texas System

Construction of an extensive crude-gathering system and an outlet for fields on the northeastern edge of the Permian basin will be undertaken by Service Pipe Line Co. as soon as pipe and equipment can be moved in.

The outlet, a 135-mile 8 and 10-in. line, will extend from the vicinity of Old Glory field to a connection with Service's present system at Bowie, Tex. It will transport crude gathered by new systems in Old Glory, Kiowa Peak, and North Aspermont fields of Stonewall County; in Haskell field of Haskell County; and in North Knox City field of Knox County.

J. L. Burke, president of Service, said the line at present will serve new development in the Stonewall-Haskell area, but that it will cross an area where active exploration is under way. He expressed confidence that the area traversed has a bright future.

Service early in April began gathering oil produced from 1,633 wells on 320 leases in Throckmorton, Shackleford, Stephens, and Haskell counties. Gathering systems from several new fields in Runnels County are now under construction.

Burke said that survey parties are staking out routes for the sections of the program to be laid first, and that pipe for the project is available.

El Paso Plans Court Test

EL PASO, Tex.—El Paso Natural Gas Co. intends to carry its dispute with the Department of Interior to the courts in an effort to complete construction of its $44,500,000 San Juan pipe line across Arizona.

Paul Kayser, president of El Paso, said the company will file suit soon in Federal District Court at Washington, D. C., to determine the company's legal obligations as a common carrier.

Kayser said he hoped that the suit would lead to an agreement with the Interior Department that would permit completion of the line while the court is settling the common-carrier issues.

Only 30 miles of the line remained to be laid when work on it was stopped 2 weeks ago *(The Oil and Gas Journal, May 3, 1951, page 145)*.

The department entered the dispute because the intended route of the pipe line crosses the Navajo Reservation over which the department has jurisdiction. Construction was stalled when the department refused to grant right-of-way over these lands until El Paso changed its rate schedules filed with the Federal Power Commission to reflect common-carrier status.

Meanwhile, FPC announced last week that it was drafting a bill which would give jurisdiction over natural-gas pipe lines crossing public lands to the commission instead of the Interior Department.

Penn. Gas Co. Line O.K.'d

WASHINGTON.—Pennsylvania Gas Co., of Warren, Pa., has received Federal Power Commission authorization for the construction of 52 miles of 12¾-in. natural-gas line and five new compressor units on its system in Pennsylvania.

The new line will parallel existing transmission lines between Warren and Erie. The company said the line will be used during the winter to augment the supply of natural gas to Corry and Erie, and during the summer months to transport gas to the company's storage areas.

Three additional gas compressor units totaling 990 hp. will be installed at the company's Roystone compressor station in Warren County, and two additional units totaling 440 hp. will be installed at the Sackett compressor station in Elk County.

Estimated cost of the facilities is about $2,200,000.

United Completes Texas Line

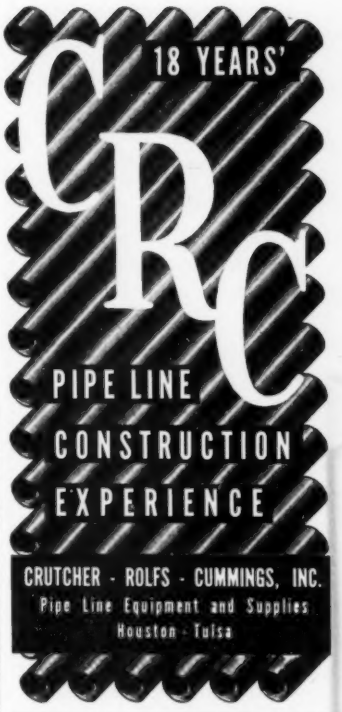
SHREVEPORT. — Completion of a 50-mile, 30-in. natural-gas pipe line from Magnet-Withers field in Wharton County, Texas, to Missouri City, west of Houston, was announced last week by the United Gas Pipe Line Co.

The project, part of a major United Gas program to increase the supply of natural gas from the Houston area, included the laying of more than 80 miles of new pipe line paralleling the firm's 18-in., Refugio-Houston line, overhead crossings of the Colorado and Brazos rivers, and a 3.8-mile, 12-in. line from the company's Missouri City junction to the West Junction power plant of Houston Lighting & Power Co.

Compressor Station Sought

WASHINGTON.—Atlantic Seaboard Corp., of Charleston, W. Va., has applied to the Federal Power Commission for authority to construct a 3,520-hp. compressor station in Randolph County, West Virginia. The station would be built on the company's Cobb-Rockville, 26-in. line to provide additional capacity sufficient to meet the 1951-52 peak requirements of its present natural-gas customers.

It would contain four 880-hp. gas-engine-driven compressor units. Estimated cost of the construction is $1,350,000.



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Texas-Louisiana Firm Is Operated as Partnership

TEXAS - LOUISIANA CONTRACTORS, of Fort Worth, is a partnership of Robert Thomas, managing partner, in association with J. C. Briscoe and J. C. Minyard. For the construction of the project for United Gas Pipe Line Co., Gulf Southern Contractors has recently been organized as a joint venture under the management of Robert Thomas. This venture includes four companies: in addition to Texas-Louisiana Contractors, these are Morrison-Knudson Co., Inc., of Boise, Idaho; J. Ray McDermott & Co., Inc., of New Orleans; and Oklahoma Contracting Co., Dallas.

ROBERT THOMAS

Executives. — Robert Thomas began his pipe line career in 1919 in the Eastland and Ranger areas of Texas with Prairie Pipe Line Co. In 1940 he joined O. C. Whitaker Co. and continued with that company until recently when it was succeeded by the partnership now known as Texas-Louisiana Contractors.

J. C. BRISCOE

J. C. MINYARD

J. C. Briscoe and J. C. Minyard have been engaged in pipe lining for 20 years. Briscoe joined O. C. Whitaker Co. in 1940 and Minyard in 1941.

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Current operations. — Work contracted by Gulf Southern Contractors for 1,007 miles of gas lines for United Gas Pipe Line Co. will be directed from an office which has been established at 516½ Louisiana Avenue, Shreveport. At the height of construction there will be several spreads in the field. Laying operations have been divided under Gulf Southern as follows: Texas-Louisiana M-K (a joint venture) will perform half the work; J. Ray McDermott & Co. and Oklahoma Contracting Co. will each perform a fourth.

Equipment.—Texas - Louisiana Contractors operates four spreads of equipment for big-inch construction plus additional equipment for river crossings and lateral lines.

Headquarters. — General offices and warehouses are located in Fort Worth. There are branch offices at Rosenberg and Angleton, Tex., in addition to the Gulf Southern office at Shreveport, previously mentioned. Other branch offices will be opened to handle construction on the United Gas project as materials arrive and work progresses.

Pennsylvania to Extend Line

WARREN, Pa.—Pennsylvania Gas Co. plans to start construction soon of a 26-mile, 12-in. extension of its line completed last year from Roystone, Pa., to Warren. The extension will carry the line from Warren to Corry, Pa.

The new carrier will cost an estimated $800,000 and is scheduled for completion by early fall.

Pipe-Line Briefs

Pure Oil Co. chairman, Rawleigh Warner, predicts that products will be moving through the 100-mile line from Pure Oil's refinery at Newark, Ohio, to Dayton by June 1. The line will be connected with another which will enter Cincinnati.

Bay Petroleum Corp.'s crude-oil-gathering system now being built from Olsson and Smolan fields, Saline County, Kansas, to the company's system in Central Kansas is scheduled for completion May 15. The system comprises 17 miles of 2, 3, 4, and 6-in. lines. It will deliver crude to Bay's McPherson refinery through the company's line from Lindsborg field.

Sunray Pipe Line Co. has bought 4½ miles of 2 to 6-in. crude-gathering lines in the North Alma area of Stevens County, Oklahoma, from Service Pipe Line Co. The gathering system connects 16 leases which produce about 1,100 bbl. per day. The lines adjoin Sunray's 4-in. line to Interstate Pipe Line Co.'s Tussy, Okla., station, where the crude will be delivered for interchange.

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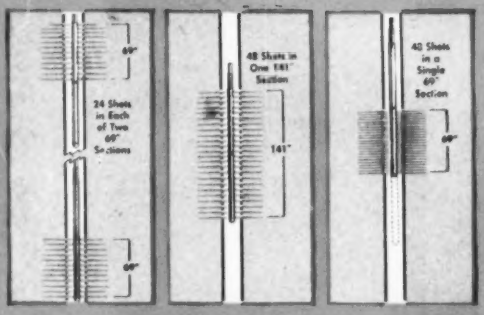

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Carmi Firm Contracts Tests for Gas Storage

Eakle & Holder Drilling Co., Carmi, Ill., has the contract for a series of stratigraphic tests which Natural Gas Pipeline Co. of Chicago is undertaking near Herscher, Kankakee County, northeastern Illinois, to determine the feasibility of establishing an underground gas-storage reservoir in that area. Drilling is under way on the first test, projected to a depth of 1,600 to 1,700 ft. where a stratum capable of storing gas is believed to exist.

Tine Gaiser Awarded 16-Well Navy Contract

Tine Gaiser, Bakersfield, Calif., has been awarded a contract by the Naval Petroleum Reserve for 16 wells to be drilled in the Elk Hills field, Kern County, California. First well will be No. 73-11G, in 11-31s-24e. Equipment has been moved in.

Coastal to Bakersfield

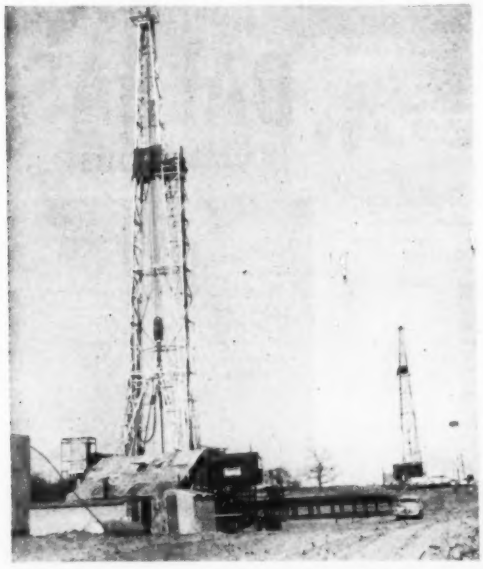
Coastal Drilling Co. has moved its West Coast headquarters offices from Los Angeles to a new location on Lahore Road, Bakersfield, Calif. C. T. Whitney, superintendent, already is a Bakersfield resident. John Brooks, office manager, now living at Los Angeles, will move to Bakersfield.

Glenn Drilling Co., Tulsa, has a rig working for Sunray Oil Corp. on a Pettit zone test in the Dykesville field, Webster County, northern Louisiana The test is 1 Morgan, NW SW 35-23n-9w.

Big Chief Drilling Co., Oklahoma City, is moving a large rotary rig to a wildcat location 4 miles northeast of Berlin and 7 miles southeast of Cheyenne, Rogers County, western Oklahoma, where it has a contract for a 11,000-ft. test to be drilled for Gulf Oil Corp. and Continental Oil Co Location is in the C SE NE 14-12n-23w, on the Taylor lease.

Tiger Drilling Co., Oklahoma City is starting two new wells for Ashland Oil & Refining Co. in Oklahoma County, Oklahoma. One is 2 Walter Wilson, C SW NW 6-14n-2w, Southeast Waterloo pool. The other is 1 Swen, NW NE SW 16-12n-2w, Witcher area.

Vierson & Cochran, Inc., Okmulgee, has been awarded a contract by Vickers Petroleum Co. for a deep wildcat test to be drilled in western Garvin County, Oklahoma. Location is for 1 Parks, in the SE NW NE 6-2n-3w. It is 2½ miles west of the Southwest



Drilling activity in the southeast extension trend of the Velma field, Stephens County, southern Oklahoma. Rigs shown, left to right, are those of Arrow Drilling Co. and Zephyr Corp., Tulsa, drilling for Sinclair Oil & Gas Co., and Harbar Drilling Co. (faintly visible), Wichita, drilling for Stanolind Oil & Gas Co.

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Panther Creek pool, near the Stephens County line. Contract is for 10,000 ft. or the Springer sand.

Puckett Drilling Co., Tulsa, has a rig working for Finston & Co. in the Tryon area of Lincoln County, Oklahoma. Current operation, 1 Dumas, NE NE NE 6-16n-3e, 2 miles west of production of the Northwest Tryon pool, is contracted to 4,500 ft.

Wise Drilling Co. is the contractor on a wildcat test which Signal Oil & Gas Co. is starting in the Maria De-Soto Survey, 7 miles southwest of Kemp, in Kaufman County, East Texas. Contract is for 5,000 ft. or the Paluxy sand.

Fleet Drilling Co., Ada, is moving a light rig to a location just east of the city limits of Pauls Valley, Garvin County, Oklahoma, where it will drill at 3,700-ft. Simpson sand test in partnership with Harry H. Diamond, Inc., and Owen H. Rives. The test is 1 Dixon, in the SE SE SE 9-3n-1e.

Brown Drilling Co., Long Beach, Calif., has a contract to deepen an old hole which Standard Oil Co. of California has taken over in the Bolinas Bay area, 20 miles northwest of San Francisco, in Marin County, California. The hole, on the W. S. Tevis ranch, was abandoned in 1947 at a total depth of 5,123 ft.

Helmerich & Payne, Inc., Tulsa, is starting a deep test for Howell & Howell of Dallas and Walter Duncan of Oklahoma City in the area 4 miles northwest of the Elk City field, Beckham County, western Oklahoma. Location is in the C SE NW 4-10n-22w, on the Hunger lease. Hole is projected to below 11,000 ft.

Baker-Price Drilling Co., Shreveport, has contracted for a 5,000-ft wildcat test to be drilled for Jack Anderson in the area about 4 miles northeast of Longwood, Washington County, Mississippi. Location is on the Trotter lease in the NE NE SE 35-16n-8w.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 4-30-51	Change week ended 4-23-51	Change week ended 5-1-50
Gulf Coast	533	— 6	+ 21
W. Tex.-N. M.	842	—13	+ 120
Ark.-N. La.-E. Tex.	142	+ 1	+ 11
Oklahoma	309	— 8	+ 54
Kansas-S. Nebraska	157	— 7	+ 35
Illinois-Eastern	126	+41	+ 6
Rocky Mountains	119	— 3	+ 47
Pacific Coast	150	0	+ 35
Total United States	2,378	+ 5	+329
Western Canada	115	+21	+ 66
Total	2,493	+26	+395

*Courtesy of Hughes Tool Co. Trends in drilling activity in the United States as a whole and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown by charts on pages 190 and 191.

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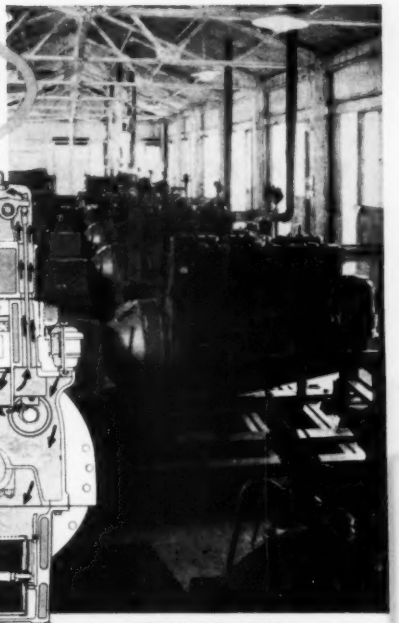

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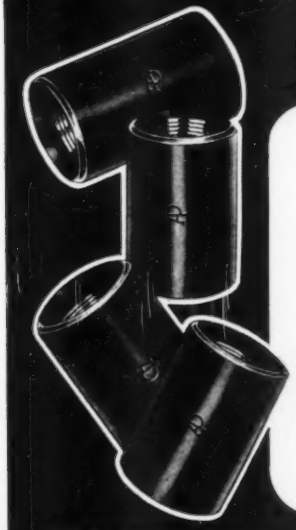

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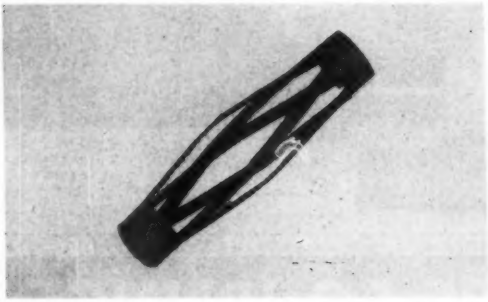

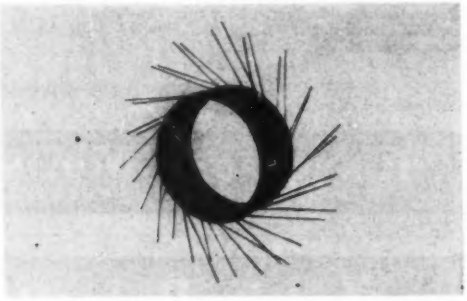

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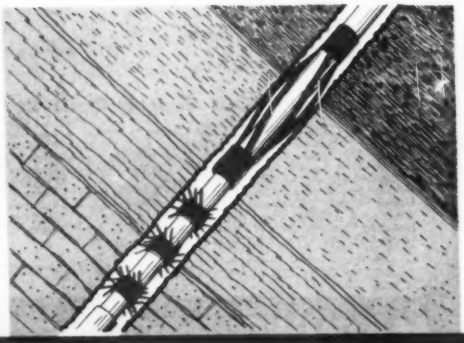

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Pemex's Macuspana Basin Strike

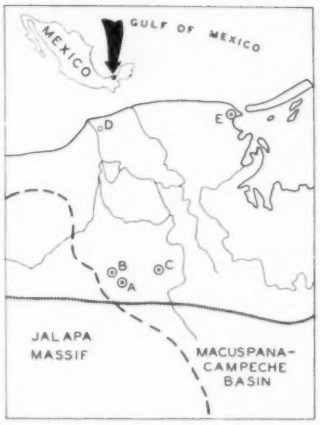
IN Mexico's Macuspana-Campeche basin, Petróleos Mexicanos 1 José Colomo (A on map) has been completed as a flowing discovery. The well, located on a seismograph-mapped structure covering an area of about 5 sq. miles, flowed 90 bbl. of 45°-gravity oil accompanied by 5-6 million cubic feet of gas through a ¾-in. choke in 4 hours. Current daily gage is 240 bbl. of oil and 5 million cubic feet of gas on a 9/64-in. choke. Two locations have been staked at the new discovery, and drilling is already getting under way at one of them.

The 1 José Colomo was drilled to a total depth of 5,577 ft. Production is through perforations at 5,203-40 ft. opposite the lower Miocene-upper Amate topped at 4,200 ft.

At the present time the oil is being barged down the Chilapa River to Frontera (D on map) and then on to the refinery at Minatitlán, Vera Cruz, about 170 miles westward along the coast. Plans for a pipe line from the discovery to tie in with the system at El Plan, a producing area about 35 miles southeast of the refinery, are expected to materialize in the near future.

The Macuspana-Campeche basin has long been considered as having excellent oil possibilities, but until recently the inaccessibility of this usually swampy region has restricted geological and geophysical work. Regional studies, based on surface geologic work in the hills to the south and west and on gravimetric surveys throughout most of the swampy area, were made to lay a foundation from which detailed work could proceed. Seismic work was initiated last year following the completion of the Southeastern Railroad line through this country. As all of the fields thus far discovered in the isthmus region are believed to be associated with salt domes, the refraction method of seismic surveying, as well as the reflection method, is employed in attempts to locate new fields.

Numerous anticlines have been found along the eastern boundary of the Jalapa massif. Nearly all of these anticlines trend parallel to the boundary of this intensely folded belt and are found to be cut by two systems of faults at approximately right angles to each other.



Only the Tertiary rocks are known in the Macuspana-Campeche basin and so far only the lower Amate formation has indicated commercial oil possibilities though shows of oil have been encountered in younger formations. On the basis of gravity data it is believed that the salt masses associated with known structures are not so thick as to preclude tests of Paleozoic rocks.

The abnormally high pressures encountered in shallow Tertiary beds prevented adequate testing of several known structures for many years. The numerous attempts to test the asymmetrical, faulted Sarlat structure (C on map), which began as far back as 1886, were all unsuccessful until 1947 when Pemex completed a small gas-distillate well in the lower Amate. This well was soon flooded out and two subsequent tests have failed to make commercial producers.

At Fortuna Nacional (B on map) high pressures were also responsible for the failure of early tests. In 1949, Pemex managed to complete a well on this fold which initialed 170 bbl. of distillate and 1,940,000 cu. ft. of gas daily from the lower Amate. Last year an additional oil well and one gas well were finaled on this anticline. The only other producing well in the basin is on the Xicalango structure (E on map) which was completed last year by Pemex in the upper Amate for 2,203,000 cu. ft. of gas daily.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTHWEST TEXAS.—Phillips Petroleum Co. 9 Copano Bay State, Tract 67, located in Copano Bay, Aransas County, appears to be a discovery of unusual importance. A total of 130 ft. of sand carrying oil shows were logged and cored in the wildcat. This well is believed to be across a major fault from Copano Bay and Fulton Beach fields.

ROCKY MOUNTAIN REGION.—Amerada Petroleum Corp. will deepen the Beaver Lodge, North Dakota, wildcat after testing 16 bbl. of oil per hour with considerable gas daily. Roy M. Johnson has made an important gas discovery in Upper Cretaceous sands in western Colorado.

WEST TEXAS.—Another 2-mile extension to Tex Harvey field was completed for 630 bbl. of oil a day. The well is El Capitan Oil Co.'s 1 Wrage-Hendrickson, on the Glasscock County side of the field. Completion gage was through ½-in. choke. Second well for North Hulldale field of Schleicher County came in with a flow of 79 bbl. of oil an hour at G. W. Strake 1 J. Forrest Runge, northwest offset to Hiawatha's discovery. The new producer topped the first Pennsylvanian at 5,547 ft., on elevation of 2,176 ft., and had first pay around 5,585 ft. The flow was from jet perforations at 5,611-26 ft. Sinclair 1 McElroy Ranch, first completed as a discovery in the Ellenburger, has also been completed in the Pennsylvanian Strawn, for a potential of 288 bbl. a day.

Kansas

Julesburg Basin Test In Kansas Shows Oil

THE Kansas sector of the Denver-Julesburg Basin came into the picture during the past week when a test being drilled by Ben F. Brack in Cheyenne County, in the northwest corner of the state, encountered promising oil showings in the Lansing lime. The test, 1 Judy, NW SE NW 26-1-39, at latest report was being drilled ahead with the Arbuckle lime as its objective.

Showings were in the upper part of the Lansing, top of which was cut at 4,180 ft. (—1,058 ft.). A drill-stem test of this zone with bottom of the hole at 4,195 ft. yielded some free oil and 30 ft. of oil-cut mud with tester open only 30 minues. Indicated bottom-hole pressure was 1,340 ft.

Location of the test is approximately 4 miles from the Nebraska line and about 20 miles from the Colorado line, Cheyenne County being the most northwesterly county of the state. This is on the southeasterly flank of the basin, which extends across the northwest corner of the state, and about 100 miles southeast of the producing areas which have been discovered in the Nebraska portion of the basin. Nearest production in Kansas is about 70 miles to the southeast in the small Adell pool, in Sheridan County. This is not associated with the basin development.

On the opposite side of the state, in Sumner County, Petroleum Trading & Transport Co. has a Simpson sand discovery at its 1 Zoglmann, NE SE NW 8-31-1w. This well had 2,080 ft. of clean oil and 420 ft. of sulfur water in the pipe following a 45-minute drill-stem test of that sand at 4,038-44 ft. Top of the pay was logged at 4,036 ft. (—2,733 ft.). Bottom-hole pressure was 970 ft. After the test, hole was deepened to 4,060 ft. and casing run through the pay zone to 4,058 ft. Sumner County is in the southern tier of counties bordering Oklahoma.

Derby Oil Co. is opening a new field in southwestern Rooks County, on the northwestern trend of the Central Kansas Uplift, where its 1-A Rogers, SW SW SW 22-10-20, swabbed 70 bbl. of oil in 10 hours while testing Arbuckle lime, open at 3,720-26 ft. with casing 1 ft. in the top. Tests followed a 500-gal. acid treatment of the pay zone. Surface elevation is 3,142 ft. The well is only ½ mile southwest of production in the Marcotte pool, but is separated from the pool by a dry hole.

KANSAS SUCCESSFUL WILDCATS

Barton County: Anschutz 1 Riedel, CEL E 2 E 2 10-17s-14w, pumped 873 bbl. oil from Lansing at 3,277-82 ft., TD 3,480 ft., anhydrite 950 ft., Heebner 3,131 ft., lime 3,202 ft., Sooy 3,435 ft., Arbuckle 3,459 ft.

Morton County: Cities Service 1 Greenwood "B," NE NE NW 14-33s-42w, 1,300,000 cu. ft. gas from Morrow at 4,872-80 ft., TD 6,000 ft., anhydrite 1,465 ft., Fort Riley 2,152 ft., lower Fort Riley 2,250 ft., Lansing-Kansas City 3,204 ft.

Phillips County: Westgate-Greenland 1 Ehm, NW NW SE 23-3s-19w, pumped 37 bbl. oil from Lansing at 3,188-3,293 ft., TD 3,488 ft., anhydrite 1,495 ft., Heebner 3,086 ft., Dodge 3,110 ft., Arbuckle 3,476 ft.

Rooks County: Nadel-Gussman 1 Rogers, NE NE NW 23-10s-20w, pumped 2,664 bbl. oil from Arbuckle at 3,775-79 ft., TD; anhydrite 1,642 ft., Heebner 3,446 ft., Toronto 3,467 ft., Lansing-Kansas City 3,485 ft., Sooy 3,728 ft., Simpson 3,763 ft.

Russell County: Mai 2 Dumler, NW SW SW 2,000,000 cu. ft. gas from Tarkio at 2,400-15 ft., TD; anhydrite 860 ft., new pay in NE Russell.

KANSAS WILDCAT FAILURES

Barber County: Beardmore 1 Calloway, NW NW NW 20-31s-12w, dry, TD 4,663 ft.

Barton County: Republic Natural-Mouser 1 Thorne, SE SE SW 15-16s-13w, dry, TD 3,435 ft.

Lauck 1 Rugan, NE SW NW 12-18s-12w, dry, TD 3,445 ft.

Butler County: Cox & Burns 1 Wilson, SE SW SW 24-25s-3e, dry, TD 2,728 ft.

Lauck 1 Ellerts, SW NE SW 33-27s-3e, dry, TD 3,043 ft.

Ellis County: Glickman 1 Dinkel, NW NW SE 7-13s-16w, dry, TD 3,580 ft.

Brack 1 Stackhouse, NE NE SW 27-13s-18w, dry, TD 3,690 ft.

Sunray 1 State, NE SW SW 5-14s-18w, dry, TD 3,721 ft.

Graham County: L. Phillips-Strain 1 Hutton, SW SW SW 28-8s-22w, dry, TD 3,900 ft.

Fred Drilling 1 Lloyd, SE SE NW 33-9s-22w, dry, TD 4,092 ft.

Hodgeman County: Berwick 1 Jones, NW SE NW 14-24s-24w, dry, TD 4,871 ft., anhydrite 1,085 ft., Heebner 4,050 ft., Lansing-Kansas City 4,121 ft., Sooy 4,768 ft., Mississippi lime 4,841 ft.

Marion County: Alpine 1 Rudolph, SE NW SW 32-18s-4e, dry, TD 2,433 ft.

Marshall County: Falcon-Seaboard 1 Randell, NW NE SW 22-3s-7e, dry, TD 2,322 ft., Lansing-Kansas City 1,150 ft., Marmaton 1,385 ft., Sooy 1,490 ft., Hunton 1,516 ft., Maquoketa 1,830 ft., Viola 1,872 ft., Decorah 2,075 ft., Simpson 2,200 ft., granite wash 2,255 ft., granite 2,295 ft.

Pawnee County: Iron 1 Fleske, SW NW NW 28-20s-16w, dry, TD 3,943 ft., anhydrite 1,098 ft., Heebner 3,446 ft., Lansing-Kansas City 3,528 ft., Sooy 3,839 ft., Simpson 3,893 ft., Arbuckle 3,904 ft.

Phillips County: Black Cat 1 Byerstrom, SE SE SE 7-1s-18w, dry, TD 3,728 ft., anhydrite 1,675 ft., Lansing-Kansas City 3,274 ft., Arbuckle 3,714 ft.

B & R 1 Vielguth, NW NW SW 26-1s-18w, dry, TD 3,572 ft., Topeka 3,201 ft., Heebner 3,418 ft., Lansing-Kansas City 3,445 ft.

Rooks County: Deep Rock 1 Thyfault, SE SE SE 8-8s-20w, dry, TD 3,618 ft.

Russell County: Nadel-Gussman 1 Lipprand, NW NW SE 2-15s-13w, dry, TD 3,380 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Idecker 1 Gerwick, NW NW SW 30-3n-17e, dry, TD 2,585 ft.

South Louisiana

Warren Wildcat Extends Crowley Field Production

NEW ORLEANS.—Oil production has been extended ½ mile east at Crowley field, Acadia Parish, by Warren Oil Corp. 1 Elmer E. Jeffers, 10-10s-1e. Through perforations at 9,819-24 ft. in the Baronet (Marg.) zone, the well flowed 453 bbl. of 38°-gravity oil daily. Hole is bottomed at 11,260 ft. and operator set 7-in. casing at 10,457 ft.

Richardson & Bass have set pipe to 14,183 ft. in their Lafourche Parish wildcat and apparently are preparing to test the well. The operator's 1-K Lafourche Realty Co., 31-19s-23e, had oil shows between 13,960-14,040 ft. At last report, the well was bottomed at 15,039 ft.

In Allen Parish, Niloco Co. and Bel Oil Corp. 1 J. A. Bel, 25-6s-7w, oil discovery, is still testing. Latest gage was through perforations at 5,888-90 ft. Through 5/64-in. choke, the well had a calculated flow of 49 bbl. oil per day based on an 8-hour test.

In Weeks Island field, Iberia Parish, Shell Oil Co. 1 H. T. Gonsoulin, 41-14s-7e, is coring below 15,000 ft. Operators have quit releasing information on this well, which may prove to be the deepest producer in Weeks Island field, as well as in the state of Louisiana. The deepest producer in the field is flowing oil through perforations at 15,138-48 ft.

Los Nietos Oil Co. has abandoned 1-1 State Lease 1,795-Louisiana Land & Exploration Co., Pelican Lake prospect in Terrebonne Parish at total depth of 12,475 ft. No shows of consequence were found in the wildcat. The venture was located 11 miles southeast of Lake Pelto field in 28-23s-16e.

Superior Oil Co. and Clovelly Corp. are drilling ahead below 12,182 ft. at 2 Clovelly Corp., 33-18s-22e, southwest offset to the Clovelly field discovery in Lafourche Parish. Pay was found between 12,305-15 ft. in the pool opener.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Ascension Parish: New pay at Darrow—Temple Hargrove and The Texas Co. 1 Guiliuzzo Unit 1, 49-10s-2e, TD 11,550 ft., perf. 9,899-9,911 ft., IP: 226 bbl. oil per day, 9/64-in. choke, 37.5° gravity, TP 1,515 psi.

SOUTH LOUISIANA WILDCAT FAILURE

Avoyelles Parish: Hunt Oil Co. 1 B. F. Lemoine, 26-1n-6e, dry, TD 10,688 ft.

Appalachian-Ohio

Leidy Township Gets Another Gas Well

PITTSBURGH.—New York State Natural Gas Corp. completed N-192 Elizabeth Daugherty et al., in Leidy Township, Clinton County, Pennsylvania, gaging 3,800,000 cu. ft. of gas. The Onondaga was topped at 5,878 ft., Oriskany sand 5,899 ft., gas 5,900 ft., rock pressure in 24 hours 3,550 psi.

In Big Creek district, McDowell County, West Virginia, Hope Natural Gas Co. 9470 Olga Coal Co. gaged 1,284,000 cu. ft. of gas from the Berea sand. Total depth was 4,507 ft. In Union district, Putnam County, Godfrey L. Cabot, Inc., 1-1346 H. H. Kessell, elevation 740 ft., tested 1,050,000 cu. ft. of gas, after shot. The following tops were logged: Corniferous lime 4,787 ft., Oriskany sand 4,882 ft., gas 4,885-4,888 ft. Total depth was 4,920 ft.

In Garrett County, Maryland, Columbian Carbon Co. 1-GW-1505 William R. Offutt is drilling at 3,478 ft.; Eberly & Snee 1 R. L. Gilbert, 4,325 ft., and 1 Floyd Artes, 3,080 ft.; Blaho Oil & Gas Co. 1 C. L. Richards, 150 ft.; Union Drilling Co. 1 Simon Cogley, 3,685 ft.; New York State Natural Gas Corp. 1-N-225 Orville Kitzmiller, 2,450 ft., and 1 N-230 C. P. Martin, 790 ft.; Huntley & Huntley 1 Earl Hershman, 2,750 ft.; Shaw & Smith 1 George Harvey (Lot), 3,140 ft.; Eagle Oil & Gas Co. 1 Emil Germain, 2,005 ft.

OHIO

COLUMBUS.—Moran Bros. have drilled in their 1 Frank McKee just north of Hanover in Lot 11, Hanover Township, Licking County, for a good showing of oil and 200,000 cu. ft. of gas. The Clinton sand was found at 2,743-96 ft. and will be shot. This area has been inactive for some time, and the well will probably bring on renewed activity.

Status Development 1 James Rice, Section 26, Pike Township, Stark County, topped the White Clinton at 4,775 ft., and finished in sand at 4,789 ft. with 600,000 cu. ft. gas natural and rock pressure of 1,200 psi. Drilling was stopped in the sand when it started to show oil. Two miles to the northeast, four oil wells were completed several years ago.

Perry County is regaining some of its former activity with four additional locations reported this week. Two of the locations were in Harrison Township, one in Reading, and a semiwildcat in Section 4, Hopewell Township.

OHIO WILDCAT FAILURES

Scioto County, Bloom Township: Clark Talbott et al 1 Scioto Farm Land Co., Section 30, Medina 2,594-2,624 ft., TD 2,634 ft.

Texas Gulf Coast

New Lolita Field Pay-Zone Discovery Runs Potential

HOUSTON.—Abe Seibel has run potential test on A-1 Ware Kelso Unit, new pay-zone discovery at Lolita field, Jackson County. Through perforations at 6,301-03 ft., the well flowed 46 bbl. of 39.3°-gravity oil daily through 5/64-in. choke. Hole is bottomed at 8,085 ft., and operator set 5½-in. casing at 8,050 ft. The well is located in Block 190, I&GN Survey 11, A-141.

George W. Graham, et al, have set 5½-in casing at total depth of 7,562 ft. for completion of 1 O. L. Caruthers, H. M. Sally Survey, DeWitt County. The wildcat had indicated gas-condensate production in the Mackhank sand topped at 7,452 ft. Drill-stem test ran at 7,462-66 ft., using 1,000-ft. water cushion, through ¼-in. chokes, recovered 270 ft. of condensate in 20 minutes. Bottom-hole pressures were 3,175 psi. open and 3,300 psi. closed. Second test run at 7,468-74 ft., using ¼-in. chokes and 1,000-ft. water cushion, recovered 1,240 ft. of oil. Attempt probably will be made for an oil completion on strength of the good oil recovery, but if the well does not make a normal-ratio oil producer, it is certain for gas-condensate production. This well is located 3 miles west-southwest of Holly field in the Yorktown area.

New Frio pay has been opened on the northeast flank of Berclair-Vicksburg field, Goliad County, at Kirkpatrick & Coates 11 Terrell. The well was completed for 22 bbl. of oil daily on pump through perforations at 2,223-35 ft. Gravity of the oil was 21°. The new sander is located in Sampson McTornall Survey.

Callery & Hurt, Inc., B-1 T. E. Inman, et al, wildcat test 2½ miles southeast of Bon Weir, Newton County, is preparing to run drill-stem test after perforating 11,840-52 ft. Total depth is 11,893 ft. where gamma ray and neutron log were run after setting 5½-in. casing on bottom. Location spots in F. H. Pollard Survey, Abstract 340.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Austin County: Oil discovery—H. L. Hawkins 1 Mewis, J. P. Stephenson Sur., A-95, TD 11,000 ft., perf. 10,455-80 ft., IP: 53 bbl. oil per day, ½-in. choke, TP 60 psi., 40.5° gravity.

Fort Bend County: Gas discovery—Goldston Oil Corp. 1 Steffek, A. Hodge Sur., A-33, TD 6,700 ft., perf. 5,070-90 ft., IP: no gage, TP 2,000 psi.

Goliad County: New pay at Berclair—Kirkpatrick & Coates 11 Terrell, Sampson McTornall Sur., TD 3,212 ft., perf. Frio "A" zone 2,233-35 ft., IP: 22 bbl. oil per day on pump, 21° gravity.

Liberty County: Oil discovery—Gulf Oil Corp. 1 Partlow, William Duncan Sur., A-28, TD 9,000 ft., perf. 8,700-22 ft., IP: 223 bbl. oil per day, 10/64-in. choke, TP 975 psi., 34.6° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: Edwards Drilling Co. 1 Uhrik, Mat Steussy Sur., A-403, dry, TD 10,310 ft.

Brazoria County: Brewster & Bartle 1 Munson, Samuel Carter Sur., A-53, dry, TD 11,655 ft.

Chambers County: Gulf Oil Corp. 5 Mayes Estate, et al, Uriah Gibson Sur., A-101, dry, TD 5,703 ft.

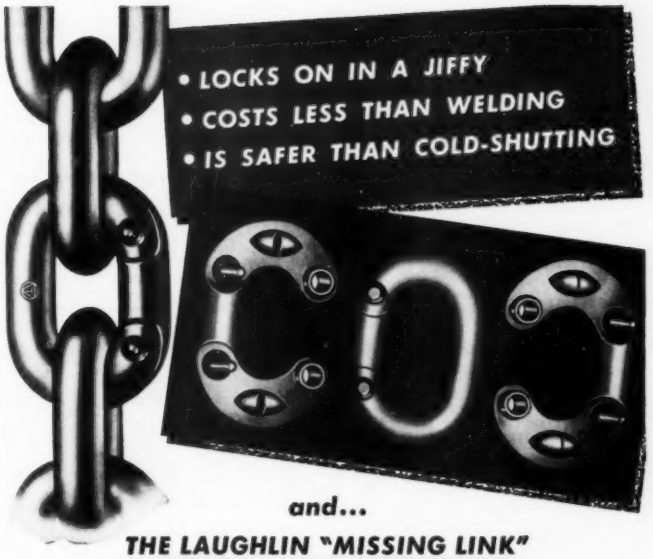
Chambers County: Kraftex Enterprises, Ltd., 1 First National Bank, Christian Smith Sur., A-22, dry, TD 7,390 ft.

Colorado County: Housh & American Republics Corp. 1 Tolbirt, John Hadden Sur., A-27, dry, TD 10,584 ft.

Goliad County: Sid Katz & G. H. Chizum 1 Mabel C. Baskins, et al, Desidero Canton Sur., A-86, dry, TD 3,804 ft.

Hardin County: Goldston Oil Corp. 1 J. Roth, W. J. Riley Sur., A-432, dry, TD 7,955 ft.

Harris County: Gulf Oil Corp. 1 St. Lease



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Karnes County: Ryan, Hays & Burke 1 J. M. Hackney, Fleming T. Wells Sur., A-289, dry, TD 3,763 ft.

Live Oak County: Argo Oil Corp. 3 T. M. Brookshire, J. Poitevent Sur. 75, A-364, dry, TD 3,911 ft.

Newton County: Houston Oil Co. of Texas and American Republics Corp. B-1 Hankamer, Chas. E. Anderson Sur. 18, A-913, dry, TD 7,902 ft.

Orange County: John W. Mecom 1 Benson, et al, Gilbert Stephenson Sur., A-167, dry, TD 9,207 ft.

H. L. Brown 1 Lucher Brown, I&GN Sec. 15, A-224, dry, TD 1,660 ft.

Tyler County: Housh Drilling Co. and Republics Corp. 1 Gober, William Reed Sur., A-565, dry, TD 10,472 ft.

Wharton County: John B. Coffee 1 Stovall, Morris & Cummings Sur. 17, A-284, dry, TD 7,272 ft.

California

Northeast Cuyama Wildcat May Open Another New Pool

LOS ANGELES.—Close on the heels of the Central Cuyama field discovery 3½ miles northeast of South Cuyama production, a wildcat midway between the Russell Ranch and Morales Canyon fields in northeast Cuyama apparently has given the area still another discovery.

The newest prospective field opened was R. B. Watkins 1 Luce, 14-11n-28w, last reported as fishing for drill pipe. Earlier it had topped an oil sand at 4,551 ft. and cored to a total depth of 4,728 ft. On a 1-hour and 20-minute drill-stem test from 4,567-4,728 ft., a good steady flow was recorded throughout the test. Spudded early in March, the wildcat was temporarily suspended at 4,540 ft. before being drilled deeper.

Seaboard Oil Co.'s Central Cuyama discovery, 1 Seaboard Richfield-Kirschmann, 22-10n-26w, was being completed as a pumper after efforts to establish flowing production failed. The well was drilled to 10,097 ft. and plugged back to 7,400 ft. Casing was perforated from 7,278-78 ft. and from 7,362-72 ft. Formation tests at these intervals indicated the discovery might make a 175-bbl. producer of 46°-gravity crude.

Unlike the other Cuyama discoveries, the Central Cuyama production does not fall on the Russell Ranch fault trend. Also it is reportedly producing from zones stratigraphically shallower than those in the other Cuyama fields. Having apparently cut only some 16 ft. of oil sand, full importance of this discovery can be determined only after additional drilling.

At Pleito Creek, at the extreme southern end of San Joaquin Valley and about 4 miles southwest of Wheeler Ridge production, Humble Oil & Refining Co. has set 7-in. casing in its redrilled 1-B Kern County Land Co. Originally drilled to 5,431 ft., hole was plugged back and redrilled up-structure to test a number of shows found in the original hole. After casing was set at 4,275 ft. in the slanted hole, a 1-hour formation test was made with the packer set at 4,220 ft. When pipe was pulled 194 ft. of gas-cut mud was recovered. At last reports the wildcat, located in 35-11n-21w, was redrilling at 4,387 ft.

At Reef Ridge in Kings County, outlook for a new discovery at Sunray Oil Corp. 68-9 Lynch-Mauren appeared not too bright. Drilled to 11,962 ft. and with 4½-in. liner landed at 11,957 ft., the wildcat was reported swabbing salt water through perforations between 8,223-11,957 ft. Only minor showings were reported in the deep test, located in 9-23s-17e, which has been under way for 10 months.

In Los Angeles County's new Newhall Townsite pool, casing has been set in the two western offsets. Talisman Oil Co. was running 5-in. liner with 68 ft. of perforations to land at 3,570 ft. in its 2 Braille. At the west offset, Tevis Morrow 1 Grayson, 5½-in. liner had been landed at 3,371 ft. and the rig being moved out.

CALIFORNIA SUCCESSFUL WILDCAT

Monterey County: Jergins Oil Co. 102-2 Rosenberg, 2-23s-10e, ½-mile northeastern extension to San Ardo field, pumped 125 bbl. daily from perforated section at 2,571-2,651 ft., 12-1°-gravity crude cut 0.7 per cent, Lombardi 2,268 ft., Orradre 2,571 ft., basement 2,651 ft., TD 2,671 ft., elev. 787 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Curry Mountain area: Signal Oil & Gas Co. 1 Signal-Camino, 31-21s-15e, dry, TD 5,589 ft., elev. 1,011 ft.

Kern County, Gosford area: Hancock Oil Co. 28-11 Kern County Land, 11-30s-26e, dry, TD 8,200 ft., elev. 355 ft.

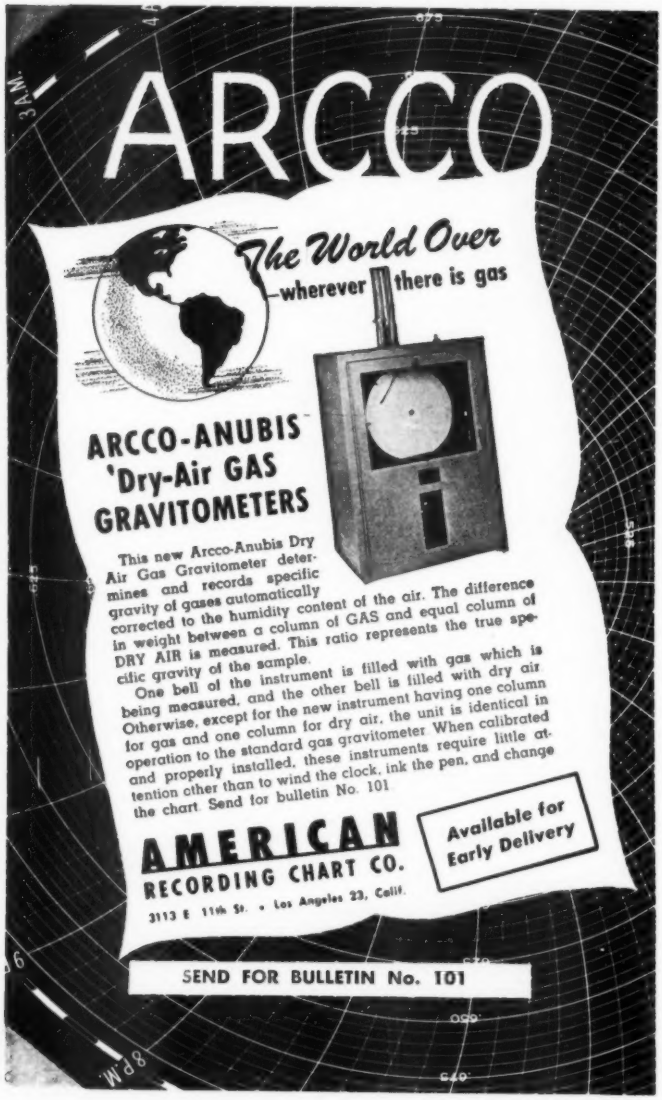
Maricopa area: British-American Oil Producing Co. 31-12 British American et al, 12-11n-24w, dry, TD 5,793 ft., elev. 835 ft.

Los Angeles County, Saugus area: Superior Oil Co. 14-23 Bonelli, proj. 23-1n-16w, dry, TD 8,569 ft., redrilled 5,502 to 8,070 ft., elev. 1,275 ft.

Monterey County, San Ardo area: The Texas Co. 1 Lanigan, 23-22s-10e, dry, TD 2,049 ft., elev. 790 ft.

San Luis Obispo County, eastern Simmler area: W. R. Whittaker Co., Ltd., 1 Norbel-Whittaker, 25-29s-19e, dry, TD 1,940 ft., elev. 3,358 ft.

Santa Barbara County, Guadalupe area: Los Nietos Co. A-1 LeRoy, proj. 14-10n-36w, dry, TD 5,295 ft., elev. 55 ft.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Southwest Texas

Copano Bay Wildcat Shows Indicate Major Discovery

CORPUS CHRISTI.—A discovery of unusual importance is indicated in Copano Bay, southwest of Copano Bay field production and northwest of Fulton Beach production in the bay. Phillips Petroleum Co. 9 Copano Bay State, Tract 67, State Subdivision of Copano Bay, logged several oil sands with an especially rich section cored between 6,630-6,800 ft., where a total of 130 ft. of sand carried oil shows. This well is believed to be across a major fault from present Copano Bay and Fulton Beach fields.

It is difficult to correlate these sands with field sands at either Copano Bay or Fulton Beach because of the major faulting between and the fact that these sands are much thicker than in either of the two fields. Electric log and sidewall samples indicated shows as follows: 6,630-50 ft., oil; 6,652-72 ft., oil; 6,674-82 ft., possible oil; cored to 6,826 ft., broken sand with possible production.

In Val Verde County, R. J. Caraway 1 Mrs. Guida Rose, rank wildcat in GC&SF RR Survey, is tesing the Ellenberger lime topped at 11,268 ft. Drill-stem test attempt failed in the top of the lime, and subsecuent test at 11,294-562 ft. also failed. Operator drilled ahead to 11,530 ft. in Ellenberger and now is testing again. Test at 11,294-11,562 ft. recovered 1,620 ft. of gascut mud, although packer slipped on the test. On a previous test of the Strawn lime at 9,851-10,003 ft., the well flowed at the rate of 3,120,000 cu. ft. of gas per day. On test of Bend lime at 10,060-10,146 ft., the well flowed 4,800,000 cu. ft. of gas daily. Operator set 7-in. casing through these zones to 10,515 ft. before drilling to Ellenberger.

A new Austin chalk discovery for Caldwell County is A. W. Phillips 1 W. J. Richards, et al, Andrew Churchill Survey, Abstract 66. Through perforations in the Austin chalk at 1,654-60 ft., the well made 30 bbl. of oil daily on pump.

Western Natural Gas Co. has gaged 13 St. Charles Ranch Co., gas discovery 3½ miles northeast of St. Charles field, Aransas County, for 7,608,000 cu. ft. of gas daily through ¼-in. chokes. Production is through perforations at 10,320-60 ft. The well lies in I. Dowess Survey, Abstract 53.

Rock Hill Oil Co. has gaged its new discovery between the Plymouth and Taft fields, San Patricio County, for an estimated 50 bbl. of oil daily through ¼-in. choke. This well is Rock Hill 1 W. L. Roots, Lot 4, Section 24, Fourth Addition to Taft Farm lands. Production is through perforations at 6,043-46 ft. Hole is bottomed at 7,517 ft. with 5½-in. casing set at 6,100 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Caldwell County: Oil discovery—A. W. Phillips 1 W. J. Richards, et al, Andrew Churchill Sur., A-66, TD 1,747 ft., open hole 1,615-1,747 ft. (Austin chalk), IP: 30 bbl. oil per day on pump.

Duval County: Oil discovery, "Parilla"—James Doughty, et al, 1 W. R. Peters, CCD Co. Sur. 65, A-693, TD 2,220 ft., open hole 2,201-50 ft. (Cole sand), IP: 40 bbl. oil per day on pump, 24° gravity.

Frio County: Gas discovery, "West Doering"—Humble Oil & Refining Co. B-1 Humble-Marrs McLean, BS&F Sur. 5, A-116, TD 4,260 ft., perf. 4,155-70 ft. (Navarro), IP: 39,300,000 cu. ft. of gas per day, open flow, TP 1,500 psi., SIP 1,655 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Cafre Research, Ltd., 2 Chas. Simmang Heirs, W. H. McCall Sur. 52, A-1,374, dry, TD 2,001 ft.

Dimmit County: Howeth & Mason 2 George Light, Jr., I&GN Sur. 85, Blk. A, A-547, dry, TD 5,933 ft.

Duval County: Hawn Bros. 1 H. S. Martin.

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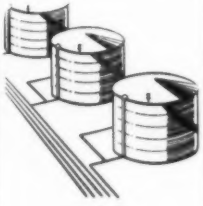

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A. S. Burris Sur. 258, A-1937, dry, TD 3,023 ft.

Jim Hogg County: Sun Oil Co. 17 A. C. Jones, Agua Nueva de Arriba Grant, A-257, dry, TD 5,210 ft.

Sun Oil Co. 18 A. C. Jones, Agua Nueva de Abajo J. M. Ramirez Grant, A-258, dry, TD 4,528 ft.

Sun Oil Co. 19 A. C. Jones, Agua Nueva de Abajo Grant, dry, TD 4,371 ft.

Sun Oil Co. 20 A. C. Jones, Agua Nueva de Abajo Grant, dry, TD 5,153 ft.

Jim Wells County: Ginther, Warren & Ginther 1 Cecilia Saenz de Lopez, El Paisano Ramon de la Garza Grant, dry, TD 6,552 ft.

San Patricio County: The Texas Co. 2 Joseph F. Green, Estate, T. T. Williamson Sur., A-286, dry, TD 9,602 ft.

Michigan

Tests Indicate Shallow-Zone Producer in Oceana County

MOUNT PLEASANT.—Natural-flow tests at McClure Oil Co. 1 Forestry Association, NE NE SE 35-15n-18w, Golden Township, Oceana County, indicate commercial completion as a shallower zone discovery in Mears Dundee oil pool. Wildcat logged Traverse lime at 1,732 ft., pay at 1,743-74 ft., and hole was bottomed out at 1,745 ft. On a restricted choke arrangement after tubing had been run, well flowed 21 bbl. on one test, 39 bbl. on another test, and 42 bbl. in 7 hours on still another test. Some difficulty in keeping the well flowing was being experienced due to paraffin.

Sun Oil Co. was coring below 5,264 ft. at the 2 Smith et al, SE SE SW 30-20n-2w, Sherman Township, Gladwin County, the first deeper-zone test in the one-well Skeels Dundee oil pool. At the present depth, the Sun test had cored through the Richfield. No interesting sections in any of the horizons penetrated had been reported. A small show of gas was reported on drill-stem test of the Detroit River "sour" zone, from 3,839-99 ft., but this did not indicate commercial production. The failure of the Sun test in the lower beds appear to have eliminated, at least in part, chances for deeper producing zones in the Skeels field area.

Carter Oil Co. is the other major acreage holder in the play, besides McClure Oil & Gas Co. It was expected that Carter would start a follow-up test on one of its two offsets in the near future.

Tests at Mogul Oil Co. 1 Hammar, SW SW NE 20-20n-9w, Sherman Township wildcat, Osceola County, showed that a plug-back with lead wool in the Dundee from 3,872 to 3,869 ft. had not shut off successfully bottom-hole water which started to show after wildcat oil discovery was acidized with 250 gal. Wool plug was being drilled out and operator planned to run another type plug to within 3 ft. of bottom in an effort to effect a water shut-off.

MICHIGAN WILDCAT FAILURES

Allegan County, Salem Township: F. W. Kehlet 1 Raab, SW SW SE 5-4n-13w, Traverse 1,683 ft., dry, TD 1,695 ft.

Arenac County, Standish Township: W. T. McKenna 1 State of Michigan, SW SE NE 12-18n-4e, Dundee 2,735 ft., dry, TD 3,355 ft.

Isabella County, Broomfield Township: W. R. Swetland 1 Winters, NE SE SE 10-14n-6w, Dundee 3,671 ft., dry, TD 3,721 ft.

Lake County, Chase Township: Brehm & Carr 1 Kilmer, NE NW NW 15-17n-11w, Dundee 3,582 ft., dry, TD 3,743 ft.

Newaygo County, Sherman Township: Cook Drilling Co. and Rex Oil & Gas Co. 1 State-Sherman, SW SE NW 4-13n-13w, Traverse 2,305 ft., dry, TD 2,309 ft.

Van Buren County, Porter Township: Fisher-McCall Oil & Gas, Inc., 1 Lamme, SW SE NW 9-4s-13w, Traverse 1,224 ft., dry, TD 1,227 ft.

Rocky Mountain

Amerada to Drill Beaver Lodge Wildcat Deeper

DENVER.—Amerada Petroleum Corp. is preparing to deepen its Beaver Lodge area, Williams County, North Dakota, wildcat after the well flowed 16 bbl. of 53°-gravity oil per hour with 3,000,000 cu. ft. of gas daily through ½-in. choke on test. The wildcat, 1 Iverson, C SW SW 6-155n-95w, is the first to indicate commercial production possibilities in the state. This well was acidized with 4,000 and 8,000 gal. in the Devonian-Silurian zone, 11,630-60 ft.

The well was drilled to 11,744 ft., total depth, and had shows below the zone tested. The wildcat started a basin-wide lease play throughout North Dakota and South Dakota, eastern Montana and southern Manitoba and Saskatchewan, with most major operators taking leases through the region. The lease play is now reported very active through northern South Dakota, where Shell Oil Co., The California Co., and others are acquiring leases.

South of Bismarck, Phillips Petroleum Co. and Carter Oil Co. are now drilling below 6,028 ft. at 1 fee, C NE NW 29-136n-81w in the St. Anthony area, Morton County. Various shows have been reported in the well in Madison and Devonian, but complete data has not been released by the operators.

In the Uinta basin of western Colorado Roy M. Johnson et al are testing in basal Mesaverde at 1 fee, C SE 12-2s-104w, in the West Douglas Creek area, Rio Blanco County. The wildcat is being drilled with cable tools and is on a farmout from Stanolind Oil & Gas Co. on a block west of gas production in lower Cretaceous zones. The well has had gas shows through the Mesaverde zone below 1,300 ft. Through the Uinta basin, the Tertiary has been productive in a recent test in Utah, and lower Cretaceous and Pennsylvanian has produced at Rangely field. The present well is the first to find production in the Mesaverde in this area.

A stratigraphic-drilling program has been started in the area south of the Salt Creek field, Wyoming. Seaboard Oil Co. and Atlantic Refining Co. are drilling at 61-27-G, NE NW NE 27-37n-80w, one of a series of wildcats through the area. E. N. Hope of Chicago has started a three-well program on a large block of leases south of this wildcat. Hope, who is associated with Great Lakes Oil Co., is starting the first test in SE NE SW 1-37n-82w, Natrona County. This general area has been of considerable interest since the discovery of oil in stratigraphic areas near Big Muddy, Cole Creek, and Salt Creek fields.

WYOMING WILDCAT FAILURE

Careyhurst area, Converse County: Phillips Petroleum Co. 1 Tank Farm, NW NW SW 2-23n-74w; TD 9,895 ft., abandoned. Teapot 3,007 ft., Parkman 4,285 ft., Steele 6,125 ft., first Wall Creek 8,053 ft., second Bench Wall Creek 8,130 ft., Muddy 9,120 ft., Fuson 9,290 ft., Lakota 9,332 ft., Morrison 9,356 ft., Sundance 9,520 ft., Chugwater 9,876 ft.

MONTANA WILDCAT FAILURE

Coyote Springs, Glacier County: Carter Oil Co. 1 Blackfeet C-304, C NW NE 35-36n-7w; TD 3,718 ft., abandoned. Kootenai 2,820 ft., Cut Bank 3,370 ft., Ellis 3,410 ft., Madison 3,570 ft.

NEBRASKA WILDCAT FAILURES

Cheyenne County: Sinclair Oil & Gas Co. 1 Gildersleeve, NE NW NW 5-16n-47w; TD 4,896 ft., abandoned. Pierre 1,058 ft., Niobrara 3,371 ft., Fort Hays 3,630 ft., Codell 3,737 ft., Carlile 3,746 ft., Greenhorn 3,910 ft., first sand 4,128 ft., Muddy 4,265 ft., Skull Creek 4,354 ft., Dakota 4,497 ft., Morrison 4,890 ft.

Big Spring, Deuel County: Shulman Brothers 1 R. J. LaGrange, NW NW NW 35-13n-43w, TD 3,762 ft., abandoned. Niobrara 2,322 ft., Fort Hays 2,628 ft.,

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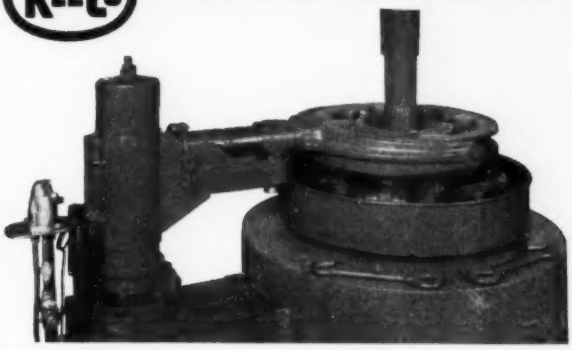

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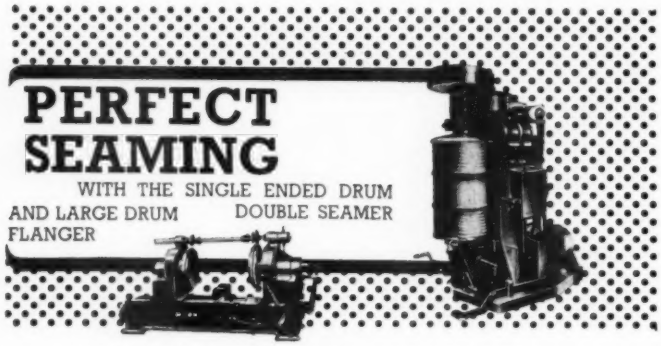

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Canadian Fields

Canadian Gulf Extends Stettler D2 Oil Field

CALGARY—Canadian Gulf Oil Co. has assured oil success in the Devonian D2 zone at a well in the northern sector of Stettler oil field, about ¾ mile from previous production. Prior to reaching the Devonian, the new oil well, Gulf-Skow 15, found moderate flows of natural gas in the Viking and basal quartz formations. The D2 zone of Devonian was oil bearing, but D3 horizon was water-loaded.

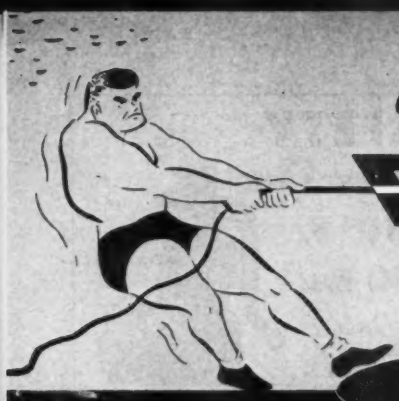
Skow 15 is located in LSD 15, 15-38-20w4, ¾ mile southeast of Can-Tex Challenger 3, D2 oil well, and 1¼ miles north of Gulf-N. J. Ellis 11, D2 producer. The D2 zone was topped at 5,082 ft., with an indicated 46 ft. of pay. A 30-minute drill-stem test at 5,148-5,208 ft. gave an oil flow in 25 minutes, at the rate of 60 bbl. hourly. The D3 zone came in at 5,388 ft., and a test in that horizon was run from 5,385-95 ft., with gas reaching the surface in 10 minutes. When pipe was pulled it contained 3,600 ft. of salt water. Bottom of the hole is 5,295 ft., and crew is now preparing to run string of production casing.

Coring and testing is continuing at the Sylvan Glen wildcat that has already struck natural gas in two horizons, and more gas plus an oil showing has been reported at latest drill-stem test in the basal Cretaceous sands. The well, Trend-Sylvan Glen 2, is in LSD 4, 17-64-26w4, 63 miles north of Edmonton. The last test was run from 2,386-93 ft., with maximum natural gas flow rate recorded at 1,180,000 cu. ft. daily during the 20 minutes that the valve was open. A previous test in the Cretaceous, from 2,862-77 ft., gave gas at the rate of 2,747,500 cu. ft. daily. A drill-stem test in the Viking sand rated gas at 1,052,000 cu. ft. daily.

Imperial Oil, Ltd., has shown some signs of oil plus water in the D2 zone of Devonian at its Sturgeon 1, wildcat that indicated possible commercial oil production in the Cretaceous over a month ago. D2 drill-stem tests had oil-cut and water-cut mud recoveries in the interval 4,415-55 ft. Crew is now heading down for D3 Devonian objective, with current bottom at 4,699 ft.

Royalite Oil Co., Ltd., and associates obtained another large flow of natural gas from the Viking sand at their Royalite-Stony Plain 2, located in the Acheson-Stony Plain area of Central Alberta. The well has now penetrated the Viking gas sand, and is continuing ahead for lower objectives. Latest test which found gas was run from 3,376-3,408 ft., with maximum natural gas flow measured at 3,500,000 cu. ft. daily. There was no fluid recovery when pipe was pulled after the 15-minute test. Another test, from 3,408-21 ft., had a recovery of 5 ft. of drilling mud, but no gas flow. Drilling is proceeding below 3,421 ft. Viking gas was first struck during a test from 3,351-76 ft. Maximum flow rate during the 55-minute test was 2,270,000 cu. ft. daily.

Armise Oil Co., Ltd., Edmonton independent that discovered basal Cretaceous oil in the Ellerslie area of Central Alberta about 4 miles west of a previous Cretaceous oil strike, has run string of production casing at its discovery. The well, Armise 1, in LSD 7, 4-52-25w4, completed drilling at 4,110 ft. and set 7-in. casing at 4,102 ft.



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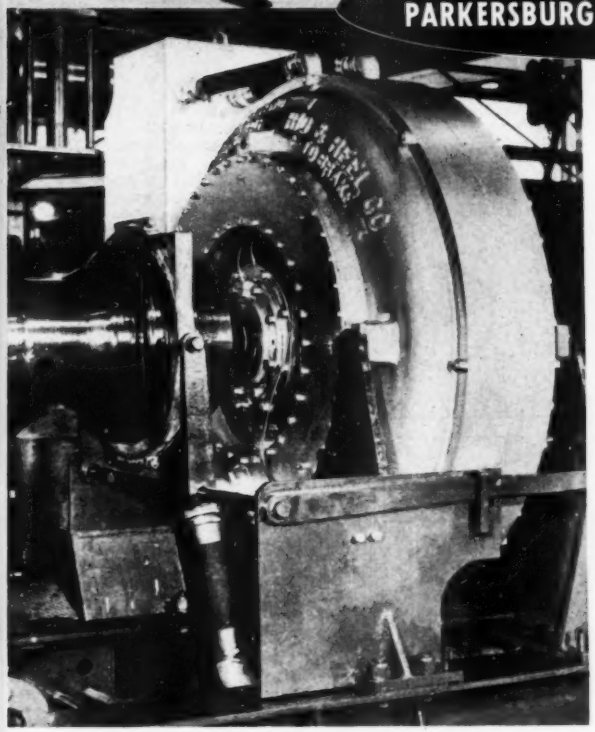

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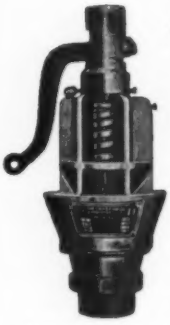

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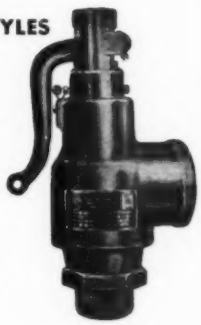

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The well flowed oil during two of several drill-stem tests run, once from 4,024-62 ft., and again from 4,062-66 ft. Further tests gave recoveries of oil and oil plus water. Gravity of the oil was rated around 35.8°.

CANADIAN SUCCESSFUL WILDCATS

Imperial-Little Smoky Lake 1, LSD 14, 15-75-22w4, TD 8,418 ft., natural gas discovery.

Pacific-Valleyview 2, LSD 16, 22-71-21w5, TD 5,003 ft., gas well, 4½-mile extension.

CANADIAN WILDCAT FAILURES

Trochu-Ghost Pine 1, LSD 4, 14-33-23w4, TD 6,832 ft.

Gulf-C.F.R.-Adshead 1, LSD 1, 7-39-19w4, TD 6,275 ft.

North Central Texas

Two Prospective Producers Show in Fisher County

WICHITA FALLS.—Two wells were showing for discovery production in Fisher County. Northeast of Rotan, Sinclair Oil & Gas Co. 1 Hunsaker ran a drill-stem test at 5,695-5,712 ft., identified only as in the Strawn. Gas showed in 12 minutes and recovery was 90 ft. of oil and gas-cut mud, plus 390 ft. of clean oil. There was no water. Shut-in pressure reached 2,300 psi. in 30 minutes. Operators drilled ahead to 5,937 ft. and were to test with packer at 5,900 ft.

Lion Oil Co.'s 1 Rallen, northeast of Roby field, was to run casing and complete after drill-stem testing from 3,518-78 ft. The 1-hour test had gas in 14 minutes and recovered 2,020 ft. of oil, 90 ft. of oil-cut mud, and 90 ft. of drilling mud. Flowing pressure was 900 psi.

North of Rotan field, Sinclair's 1 Belle Hunsacker was drilling at 5,832 ft. in Strawn lime and shale. Core recovery between 5,752-62 ft. was shale with 2 in. of oil-stained sand on bottom.

Shallow pay has been found in the Ellenburger area south of Aspermont at Ohio Oil Co. 2-A Leon Anderson. A 3-hour test from 4,495-4,525 ft. recovered 430 ft. of oil and 480 ft. of heavily oil-cut mud.

Further south of Aspermont, DeSoto Oil & Gas Co. 1 Bullard, Canyon sand prospect, was drilling below 5,525 ft. The well had pay possibilities between 4,900-22 ft., yielding some 2,000 ft. of free oil on first test and 4,450 ft. of oil on second test. Nearest Canyon producer is the same operator's 1 Guest, recent discovery 2½ miles to the southeast.

Sun Oil Co. 1 Harp, Nolan County deep wildcat southeast of Sweetwater, prepared to run a 4-hour test after recovering oil on its first test from 6,143-53 ft. in an unidentified limestone. In 1 hour the test produced 259 ft. of oil and 80 ft. of oil and gas-cut mud in the drill pipe.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: R. W. Darden 2 Estell-Key, W. E. Probert Sur., ¾ mi. NE Megargel, TD 1,442 ft., sand 1,440-42 ft., IP pumped 43 bbl. 37°-gravity oil a day.

Reno Oil Co. and The Texas Co. 1 L. F. Wilson "fee," Geraldine Townsite Subd., TD 3,796 ft., pay 3,774-96 ft., IP pumped 69 bbl. 41°-gravity oil a day.

W. G. Rogers 1 L. Kinder, Clark & Plumb, 3 mi. W Archer City, TD 3,803 ft., pay 3,724-30 ft., IP pumped 72 bbl. 41°-gravity oil.

Eastland County: D. D. Feldman 1 L. C. Simpson, 47-4-H&TC, 4 mi. W Eastland, TD 3,610 ft., Lake sand 3,267 ft., perforated 3,288-94 ft., IP flowed 405 bbl. 41°-gravity oil a day, ¾-in. choke, TP 985 psi., GOR reported high.

Ulmer, Lynch & Allen Co. 1 B. B. Butler, Nancy Ussury Sur., 3 mi. SE Eastland, TD 1,236 ft., pay sand 1,223 ft., IP pumped 5 bbl. 41°-gravity oil.

Haskell County: Continental Oil Co. 1 Maggie Martin, Sec. 38, Wise CSL, 3 mi. SW Rochester, TD 6,107 ft., elev. 1,627 ft., basal Pennsylvanian conglomerate 5,792 ft., perforated 5,792-5,800 ft., IP flowed 280 bbl. 38°-gravity oil a day, 40/64-in. choke, TP 200-50 psi., GOR 400/1.

Phillips Petroleum Co. 1 Herrin, P. H. Anderson Sur., 6 mi. NW Haskell, TD 6,100 ft., PB 4,905 ft., perforated 4,800-02 ft., IP pumped 93 bbl. 37°-gravity oil, GOR 141.

Montague County: Star Oil Co. 1 R. S. Cearnal, S. F. Sparks Sur., 8 mi. SW Bowie, TD 5,895 ft., Caddo 5,707 ft., IP flowed 169 bbl. 43°-gravity oil a day, ¼-in. choke, TP 375 psi., GOR 455/1.

Stephens Petroleum Co. 1 Threadgill, Jack CSL, 2 mi. NW Stoneberg, TD 6,370 ft., perforated 4,958-64 ft., IP pumped 126 bbl. 40°-gravity oil a day.

Wichita County: Irving Greenspan 1 J. M. Towles, C. C. Holcomb Sur., 2 mi. E Electra, TD 1,025 ft., pay 1,009 ft., IP pumped 12.39 bbl. 42°-gravity oil.

Wilbarger County: Baker Properties 1-B Cambron, 8-5-H&TC, 8 mi. S Harrold, TD 2,450 ft., pay 1,900 ft., IP pumped 51 bbl. 37°-gravity oil.

Young County: Joe K. Bailey and J. C. Man, Jr., 1 T. Bagley, L. W. Ross Sur., 5 mi. N Loving, TD 3,627 ft., pay 3,617 ft., pay 3,617 ft., IP flowed 96 bbl. 43°-gravity oil a day, 18/64-in. choke, CP 150 psi., GOR 420/1.

Cato Oil Co. 1 E. A. Edwards, TE&L Sur., 8 mi. E Olney, TD 5,161 ft., Caddo 4,450 ft., perforated 4,448-65 ft., IP pumped 49 bbl. 41°-gravity oil.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: W. G. Gouchie 1-A Tanner, Harris Subd., Blk. 88, dry, TD 1,235 ft.

F. M. Hood 1 Ikard, Blk. 70, Jefferson CSL, dry, TD 1,080 ft.

G. E. Kadane & Sons 5-AA Wilson, Blk. 126, ATNCL, dry, TD 1,736 ft.

The Texas Co. 1 W. C. Frey, Palo Pinto CSL, 1 mi. N Dundee, dry, TD 5,335 ft.

Brown County: Capital Co. 1 Addie Perry.

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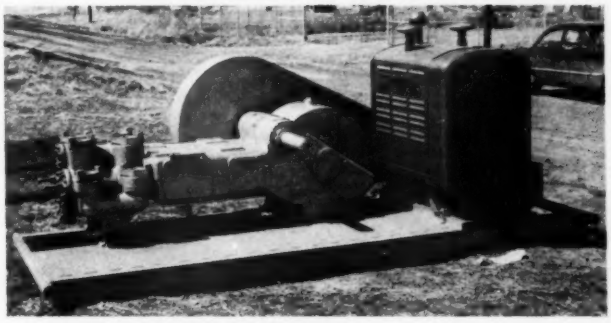

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Clarence F. Chang 1 Sallie Baker, P. A. Ackerman Sur. 314, dry, TD 1,970 ft., elev. 1,498 ft., Mississippian 1,832 ft.

Callahan County: Hooker and DeMohrenschildt 1 Wylie, Sec. 122, University Lands, dry, TD 3,779 ft., elev. 1,362 ft., Moran sand 1,798 ft., Caddo 3,237 ft.

Hooker and DeMohrenschildt 2 Wylie, 330 ft. NE No. 1, dry, TD 1,500 ft. in shale.

Clay County: Bay Petroleum Corp. et al 1 L. S. Wright & Co., Sec. 3,395, TE&L Sur., dry, TD 4,765 ft.

Coleman County: Anzac Oil Corp. et al 1 R. E. DeRusha, 274-102-C, T. Pendleton Sur., dry, TD 1,906 ft.

Haynes B. Ownby Drilling Co. 1 J. W. McCullough, Sec. 41, BBB&C Sur., dry, TD 3,763 ft., elev. 2,138 ft., Fry 3,420 ft., Jennings 3,540 ft., Gray sand 3,663

Western Petroleum Co. 1 W. H. Thate, M. Cheaves Sur., dry, TD 2,055 ft., Capps 1,480 ft., Caddo 2,000 ft.

Cooke County: A. D. Britton 1 S. T. Allen, Blk. 31, Fannin CSL, dry, TD 10,03 ft.

G. C. Cartwright 1 G. C. Cartwright, P. J. Thompson Sur., dry, TD 1,364 ft.

Harvey Drilling Co. 2 Carkier, Wm. Slingland Sur., dry, TD 1,677 ft.

Walter L. Plemons Production Co. 1 B. A. Moseley, Mary Vance Sur., dry, TD 2,563 ft.

J. Rosenberg and J. N. Moss 1 S. M. Kidd, SPRR Sur., 7 mi. NW Muenster, dry, TD 3,003 ft.

Denton County: Empire Drilling Co. 1 E. E. Sherrill, Chas. DeMorse Sur., dry, TD 1,866 ft.

Roy R. Powers 1 P. May Hill, L. Clark Sur., dry, TD 4,517 ft.

Haskell County: T. D. Humphrey 1 E. C. Daniels, John Griner Sur., dry, TD 3,661 ft.

Johnson Oil Co., Inc. 1 Paul Frierson, J. E. Ellis Sur., dry, TD 3,542 ft., elev. 1,475 ft., Palo Pinto 3,450 ft.

Montague County: Continental Oil Co. 1 M. C. Wilson, Fielding Seacrest Sur., 2 mi. SW Illinois Bend, dry, TD 4,220 ft. in the Ellenburger.

Jack County: Bridwell Oil Co. 1 T. H. Cherryhomes, R. W. McManus Sur., dry, TD 3,911 ft.

Palo Pinto County: E. P. & W. Oil Co. 1 Glen Watson, 37-2-T&P, dry, TD 1,495 ft. in sand.

Kent & Preston 1 P. L. Stephens, 81-3-T&P, dry, TD 1,350 ft. in shale.

Parker County: Kingwood Oil Co. 1 E. H. Cockburn, J. Cockburn Sur., dry, TD 3,310 ft., Caddo 2,992 ft., Daly reef 3,176 ft.

Shackelford County: J. E. Connally 1 Mrs. L. P. Meyer, F. Valdez Pre-Emption Sur., dry, TD 965 ft.

G. E. Kadane & Sons 1-A Cottle, Sec. 15, BOA Sur., dry, TD 2,580 ft.

Stephens County: Bond Oil Corp. 1 J. L. Stonard, W. T. Malone Sur., 4½ mi. W Crystal Falls, dry, TD 4,574 ft., Caddo 3,682 ft., Ellenburger 4,530 ft.

Tarman Oil Co. 6 Ware Heirs, 66-6-T&P, dry, TD 2,093 ft.

Texo Oil Co. 1-A McMeen, 46-5-T&P, dry, TD 2,739 ft., elev. 1,268 ft., Strawn 2,050 ft., lower Strawn 2,610 ft.

Tiger Minerals, Inc. 1 J. L. Harrison, Sec. 71, T&P, dry, TD 1,760 ft. in the Strawn.

Taylor County: Billups and Taubert Drilling Co. 1 W. L. Murphy, 241-64-H&TC, dry, TD 4,405 ft. in reef.

Saxon Exploration Co. 1 N. W. Wilkenson, Geo. Hancock Sur., dry, TD 4,402 ft.

The Texas Co. 2 Malone, J. W. Page Sur., dry, TD 3,165 ft., elev. 1,802 ft., Cook 2,526 ft., Swastika 2,850 ft.

Wichita County: W. R. Simpson 1 Brookreide, MEPRR Sur., dry, TD 2,035 ft.

Wilbarger County: Frank Wood 1 W. T. Waggoner, H&TC, dry, TD 2,500 ft.

Young County: R. Myers Contracting Corp. 1 J. R. Emerson, J. W. Throckmorton Sur., dry, TD 4,872 ft.

Iowa Payne Oil Co. 1 J. S. Criswell, J. A. Dowell Sur., dry, TD 3,171 ft.

D. R. Preston 1 W. A. King, L. E. Hardin Sur., dry, TD 3,705 ft.

Eastern Texas

Grayson County Wildcat Tests 415 Bbl. in 24 Hours

DALLAS.—L. O. McMillan's 1 Rich, Grayson County wildcat, completed for one of the highest potentials yet reported from the Oil Creek sand, and appears to have opened a new and separate structure.

Completion was from perforations from 6,233-35 ft. which yielded 415 bbl. of high-gravity oil in 24 hours through 3/16-in. tubing choke. Gas-oil ratio was 1,440/1. Top of the zone was 8,209 ft.

Location of the well, just north of the town of Sandusky, is nearly 2 miles northwest of the Sandusky field proper, and according to field sources, the sand was 1,000 ft. low to wells in the field. It is separated from the field by dry holes, and is 1,600 ft. east of Pure Oil Co.'s 8,280-ft. dry hole. Pure had turned its block to McMillan, retaining an overriding interest. McMillan staked location for 1 W. R. Johnson in the E. L. Stickney Survey, 2,000 ft. south of the 1 Rich. Contract depth was 8,000 ft.

East of the above area and west of Hagerman, Snuggs & Neal 1 Quinton Little, William Allen Survey, was waiting on orders after testing another Pennsylvanian sand. A 1-hour test from 3,485-97 ft. recovered 1,000 ft. of oil and 100 ft. of oil-cut mud. The section tested was the second in that formation to yield oil.

To the east of Snuggs & Neal's test, George Humphrey 1 Barnes was drilling in shale below 5,664 ft. following a successful drill-stem test in the same Pennsylvanian section which developed oil in the 1 Little.

Another producing zone in the Pennsylvanian for the Sandusky area was in prospect at Lyons, Prentiss & McCord 1 G. C.

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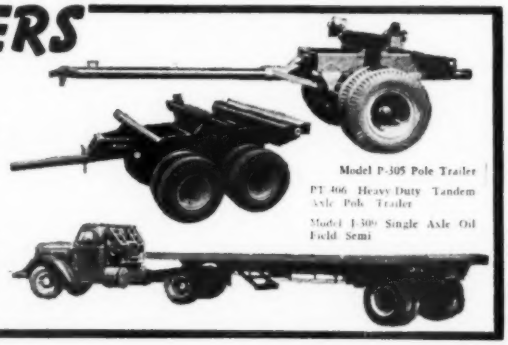

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Brown, E. Hartzog Survey. A 1-hour and 40-minute drill-stem test from 5,288-5,367 ft. had gas in 40 minutes and recovered 1,045 ft. of oil and heavily oil-cut mud, plus 90 ft. of salt water. Drilling continued below 5,674 ft.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Anderson County: D. A. McCrary 1 Southern Pine, T. M. Jones Sur., 9 mi. NE Slocum, TD 5,329 ft., Woodbine 5,275 ft., perforated 5,275-76½ ft., IP flowed 48.6 bbl. 41°-gravity oil a day, 10/64-in. choke, GOR 327/1, TP 320 psi.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURE

Fannin County: Gilchrist Drilling Co. 1 Agnes Boyd, Mary Caldwell Sur., dry, TD 3,573 ft.

Mississippi

Smackover Test Abandoned After Side-Track Failures

JACKSON.—One of Mississippi's Smackover tests has been abandoned at total depth of 13,029 ft. in Cotton Valley, after two side-track attempts failed. Honolulu Oil Corp. junked and abandoned 1 Board of Supervisors, 16-5n-9e, Scott County, when drill pipe was stuck at 3,180 ft. Operators backed off and wash pipe was stuck at 12,737 ft. Drill pipe was worked loose, but operators decided any further attempts to side track were too hazardous.

Meanwhile, one of the state's most closely watched Smackover wildcats, Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, Yazoo County, has recovered stuck drill pipe down to 11,923 ft., washed over to 12,356 ft., and are preparing to make another cut. Hard cement was found in the drill pipe at 11,300 ft. and in open hole at 12,296 ft.

At Church Hill field, Jefferson County, the east offset to the discovery well has been abandoned as a dry hole. This test, Lyle Cashion Co. 1 Frank Foster, 67-9n-1w, had top of the producing sand (Artman, Wilcox) at 5,507 ft., which is 11 ft. lower than in the discovery well. No shows were reported. A west offset to the discovery well has been announced by Kirby Petroleum Co., which will drill 1 Sam Woods, 41-9n-2w.

I. P. LaRue will attempt to extend production approximately 3 miles to the west of his Pistol Ridge discovery in Forrest County. New location, however, is some 2½ miles into Pearl River County, immediately to the west. Test will be 1 U. S. A., NE SW 10-1s-14w, which has a contract depth of 7,800 ft. Discovery well of Pistol Ridge field was LaRue's 1 Creosote Oil Corp., C SW SE 7-1s-13w, which was completed through perforations in the Tuscaloosa formation at 7,722-26 ft.

Humble Oil & Refining Co. has staked location for a Wilcox wildcat in the Green's Bayou area of Adams County. Test will be known as B-1 High Y. Junkin, 7-8n-3w, approximately 2 miles northwest of the town of Pine Ridge. Humble previously has encountered good shows in the Wilcox zone at 1 Ida Stowers, which is northeast of the new location. On drill-stem test at 5,634-37 ft. recovery was 540 ft. of oil and 440 ft. of salt water and mud. On second test of the Wilcox zone, recovery was 1,050 ft. of oil. Serious troubles were encountered when surface casing parted and the hole was junked and abandoned.

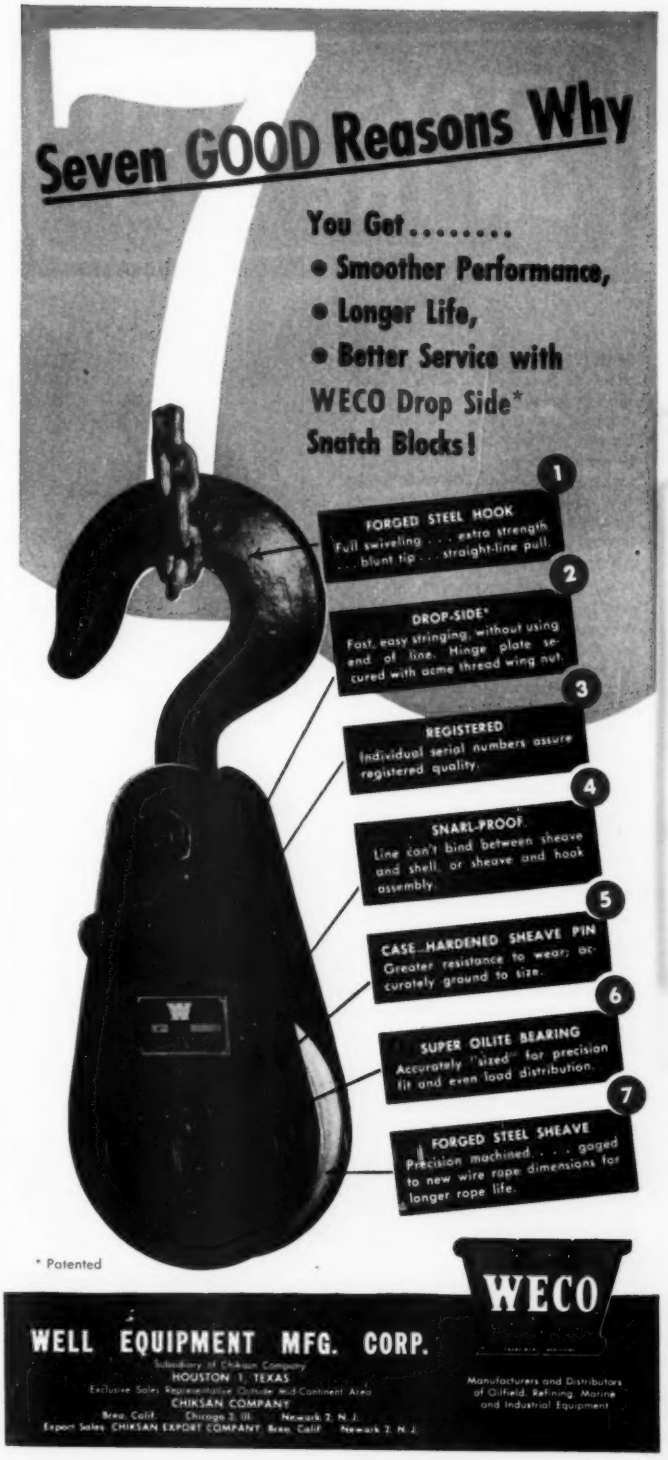
MISSISSIPPI WILDCAT FAILURE

Scott County: Honolulu Oil Corp. 1 Board of Supervisors, 16-5n-9e, abandoned, TD 13,029 ft.

ALABAMA WILDCAT FAILURES

Clarke County: John S. Neilson-W. E. Walker 1 White Smith Lumber Co., 22-7n-3e, dry, TD 5,510 ft.

Mobile County: Morgan & Borden 1 R. H. Radcliff, et al, 5-1s-1w, dry, TD 8,228 ft.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Permian Basin

Magnolia Well May Link Von Roeder, Reinecke Fields

MIDLAND—Following closely upon the completion of Shell Oil Co.'s 2 Sterling, Borden County discovery between Von Roeder and Reinecke fields, Magnolia Petroleum Co. 2 W. Ed Murphy in 69-25-H&TC may prove a connecting link between the Sterling well and the Von Roeder side.

Magnolia's well completed for a potential of 194 bbl. of 46°-gravity oil a day flowing through 16 64-in. choke from open hole at 6,783-87 ft. Gas-oil ratio was 1,223:1. A west offset was then staked as the 3 Murphy.

Northeast of Vealmoor field, Gulf Oil Corp. 1-G Higginbotham drill-stem tested 3 hours from 8,025-65 ft. Gas surfaced in 5 minutes and fluid in 15. The well then flowed 16 bbl. of oil and 64 bbl. of salt water over the balance of the test. Recovery in the pipe was 7,740 ft. of fluid, estimated at 10 per cent oil. It was to drill ahead.

Stanolind Oil & Gas Co. was still working on its 1 R. C. Miller, northeast of Gail. Testing on the swab recovered an average of 4 bbl. of oil an hour from the Canyon at 8,065-8,110 ft.

Sinclair Oil Co. 1 McElroy Ranch, Upton County, which last week turned in a high completion potential from the Ellenburger, has been dually completed from the Strawn. Flowing through 21/64-in. choke from perforations at 9,365-9,405 ft., the well made its second potential of 288 bbl. of 49.9°-gravity oil a day. Gas-oil ratio was 561:1.

Shell Oil Co. and The Texas Co. 12 Ratliff-Bedford opened a third pay, the Fusselman, in the Bedford Devonian and Ellenburger field of southwestern Andrews County. Completion potential was 626 bbl. of 41°-gravity oil through ½-in. choke from open hole at 9,702-9,895 ft.

Sohio Petroleum Co. has staked locations for four Spraberry wildcats, in four counties. In southeast Midland the 2 D. L. Hutt is located approximately 2 miles northwest of nearest production on the northeast side of Driver field.

Sohio 1 R. S. Davenport is in southwest Glasscock County and about 22 miles northeast of Weiner-Floyd field. Drilling was to start immediately.

Sohio 1 E. P. Williams was located 4 miles east of Weiner-Floyd field in northwestern Reagan County. Contract depth was 7,800 ft., and drilling was to start within 30 days.

The fourth test is 1 Ralph W. Clark, located in northeastern Upton County, 2½ miles northwest of Pembrook field. Contract depth was 8,100 ft., with no date set on drilling.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Cochran County: Stephens Petroleum Co. 1 Masten, 2-133-Armstrong CSL, TD 5,004 ft., pay 4,975 ft., IP pumped 74.5 bbl. 24°-gravity oil a day.

Coke County: Sun Oil Co. 2 H. L. Bloodworth, 462-1A-H&TC, TD 6,600 ft., PB 5,778 ft., IP flowed 55 bbl. oil a day, perforated 5,664-96 ft.

Ector County: Phillips Petroleum Co. 1 Adobe, 38-45-1S-T&P, TD 11,130 ft., elev. 3,236 ft., Clear Fork 5,550 ft., perforated 5,592-5,620 ft., IP flowed 196 bbl. 39°-gravity oil a day, ½-in. choke, GOR 1,500:1, TP 250 psi.

Tom Green County: American Republics and Cities Service Oil Co. 1 Mrs. J. V. Ketchum, John O. White Sur. 7, TD 5,738 ft., perforated Ellenburger 5,687-5,710 ft., IP pumped 18.5 bbl. 47°-gravity oil a day.

Upton County: Blackwood & Nichols 1 W. E. Gresham, Sec. 2, Indianola RR Sur., TD 7,620 ft., elev. 2,705 ft., Spraberry 6,695 ft., perforated 6,710-40 ft., IP flowed 194 bbl. 39°-gravity oil a day, ⅜-in. choke, GOR 863:1, TP 100 psi.

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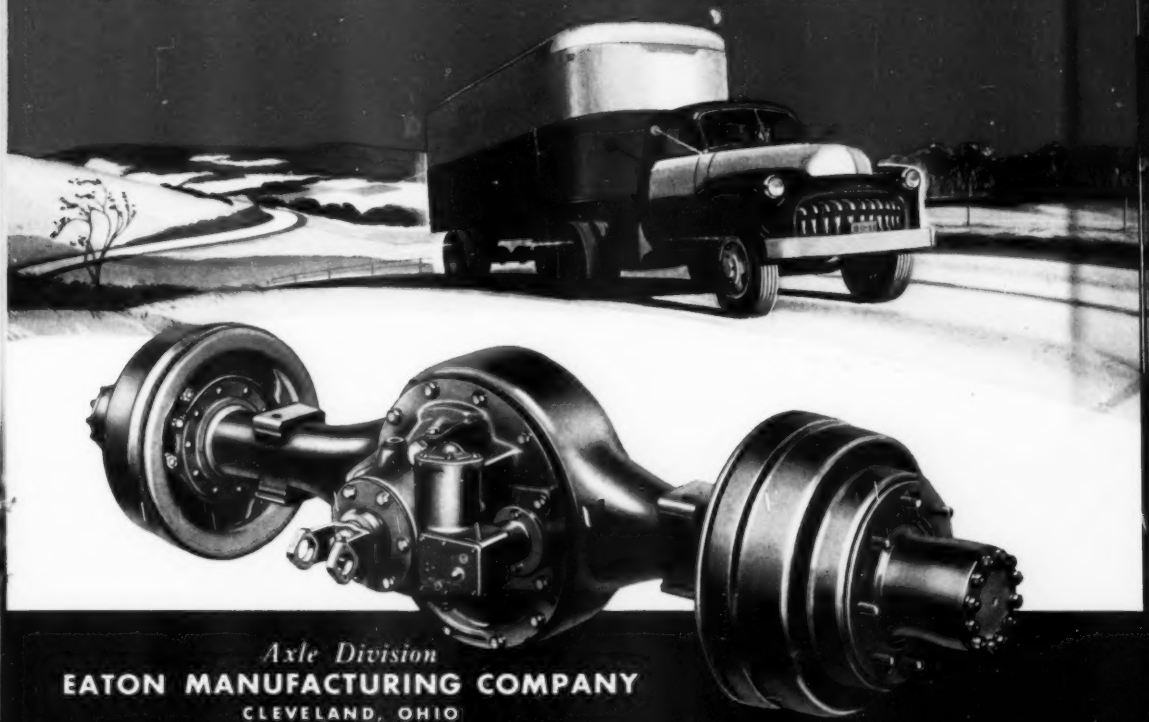

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Save Pipe, Time, and Money—Call for the Magna-Tector FIRST!

When casing, tubing, or drill pipe becomes stuck, considerable savings can be realized by calling for the Magna-Tector at once. This has been proven in thousands of wells. Estimating the stuck point, cutting the pipe, and then finding that the estimate was wrong is a costly method. Unnecessary cuts must be paid for, rig time is multiplied, and fishing usually becomes complicated.

By calling for the Magna-Tector at once, the danger of pipe sticking further up the hole is minimized. The exact stuck point is located within inches, in minutes. The number of shots or cuts required to recover all free pipe is reduced. More free pipe is recovered in ONE piece. The way is paved for other fast, McCullough electric wire line progressive tools (McCullough Jet Back-Off Tool, String Shot, or Jet Casing Cutter) to free all free pipe, making recovery of the remaining stuck sections routine.

Drill pipe is the most common stuck pipe condition. When drill pipe becomes stuck, it is usually assumed that the drill collars are stuck. Spotting oil around the drill collars, without first calling for the Magna-Tector, has proven to be false economy. In many instances, after oil had been spotted around the drill collars without results, the Magna-Tector was called upon. The stuck point was found to be several hundred feet above the drill collars. When the oil was moved up to the EXACT stuck point, the pipe was freed in only a few hours time. MORAL: Guesswork is a poor substitute for KNOWING, always use the Magna-Tector FIRST!

Not a Fishing Tool

The Magna-Tector is NOT a fishing tool. Fishing means probing with unseeing eyes. The Magna-Tector has eyes at the surface. These eyes, in the form of electronic meters, tell the McCullough serviceman what he needs to know about the condition of the pipe in the well. In some cases the Magna-Tector eliminates the need of fishing tools. In other cases it simplifies recovery by reducing the number of shots or cuts usually needed.

How the Magna-Tector Locates the Stuck Point

The Magna-Tector is an electronic tool. It is unaffected by high hydrostatic pressure or high temperature. It has been successful on over 5,000 jobs. In the world's deepest well, the Magna-Tector located the stuck point in the drill pipe below 16,000 feet!

In operation, the Magna-Tector is lowered inside of the stuck drill pipe, casing, tubing, or liner on an electric wire line. It is positioned at a predetermined depth for testing. Electric current is then turned on, energizing two electro-magnets at each end of the tool. This strong magnetic force holds the Magna-Tector, firmly, against the pipe. Tension is applied to the pipe at the surface. Any movement of the pipe between the two electro-magnets, as detected by electronic surface meters, indicates free pipe. Lack of movement indicates stuck pipe. By progressing up or down, the EXACT stuck point can be located within inches!

An Additional Service—Determining the Sticking Medium

The value of the Magna-Tector is two-fold. In many cases it can actually determine the sticking medium. It can indicate such conditions as: collapsed pipe; frictionally held pipe; bridging; and key seat conditions. In tubing it can determine whether the tubing is stuck above or below a packer or tubing hanger. With such additional knowledge, freeing and recovery of all pipe is greatly simplified.

Where drill pipe is frictionally held by mud, sand, or other impacted material, working and circulation sometimes results in freeing the pipe deeper in the well. In one outstanding instance, where this procedure was used, the pipe was freed 1,800 feet BELOW the original sticking point!

Combination Progressive Service—Another Way to Save Time

The set-up used by the Magna-Tector is the same set-up as used by any McCullough electric wire line progressive tool. Since the set-up at the well is already made, it's a simple matter to attach a McCullough Jet Back-Off Tool, String Shot, or Jet Casing Cutter to the end of the same electric wire line, after the Magna-Tector has located the stuck point. Therefore, many operators, when ordering Magna-Tector service, also order the type of progressive tool they will need to complete the job. Rig time is saved and combination service charges apply, resulting in additional savings.

Write for this Catalog

The new McCullough section of the Composite Catalog is now off the press. All 20 McCullough tools and services are included in this catalog. Illustrations, operating data, construction, and specifications. Pages 3228 and 3229 describe the Magna-Tector and its applications, with appropriate photographs and illustrations. Write to the McCullough Tool Company for your copy.

PERFORATING, TESTING AND FISHING SERVICE ANYWHERE — ANYTIME!

McCULLOUGH TOOL COMPANY

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VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

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WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: P. R. Rutherford & Sons 2 W. E. Murphy, 82-25-H&TC, dry, TD 6,914 ft., elev. 2,307 ft., reef 6,907 ft.

Coke County: Edgar Davis Drilling Co. 1 A. S. Hendry, R. Aldrete Sur., dry, TD 6,025 ft.

Concho County: Nash & Cook Oil Co. 1 Wooten, Sec. 166, T&NO Sur., dry, TD 3,572 ft., Ellenburger 3,540 ft.

Dawson County: Standard Oil Co. of Texas 1 Glen F. Pool, 123-M-EL&RR, dry, TD 11,948 ft., elev. 3,187 ft., Spraberry 7,406 ft., Wolfcamp 8,334 ft., Canyon 9,740 ft., Strawn 10,400 ft., Bend 11,280 ft., Mississippian 11,535 ft.

Garza County: H. L. Cain 1 Bevers, 106-5-H&GN, dry, TD 2,750 ft.

Howard County: Amerada Petroleum Corp. 1 T. L. Griffin, 35-25-H&TC, dry, TD 7,879 ft., elev. 2,392 ft., Dean 6,110 ft., reef 7,338 ft., Strawn 7,745 ft.

Armer, Ray & Chizum 2-C Lockhart, 34-32-3N-T&P, dry, TD 4,673 ft.

Rutherford & Pan American Producing Co. 1 "A-2" Pat Thompson, 24-27-H&TC, dry, TD 8,005 ft., elev. 2,479 ft., Spraberry 5,280 ft., Dean 6,510 ft., Wolfcamp 6,680 ft., Pennsylvanian 7,160 ft., reef 7,949 ft.

Lubbock County: Callery & Hurt 1 Howard Broadhead, 70-20-HE&WT, dry, TD 11,114 ft., elev. 3,315 ft., Clear Fork 5,520 ft., Wolfcamp 7,650 ft., Pennsylvanian 9,304 ft., Mississippian 10,572 ft., Montoya 10,990 ft., Ellenburger 11,090 ft.

Midland County: Vaughn Production Co. 1 Campbell, 16-39-2S-T&P, dry, TD 10,847 ft., elev. 2,788 ft., Spraberry 7,786 ft., Dean 9,162 ft., Pennsylvanian 10,500 ft., Bend 10,792 ft.

Reagan County: Livermore & Smith, Inc. 1 D. E. Hughes, 19-F-C&M, dry, TD 10,760 ft., elev. 2,654 ft., Spraberry 5,900 ft., Devonian 10,160 ft., Ellenburger 10,670 ft.

Runnels County: E. F. White, Jr. 1 Mrs. Louella Rampy, J. H. San Miquel Sur. 72, dry, TD 3,982 ft.

Swearingen Bros. 1 A. C. Ernst, Sec. 73, ETRR Sur. 73, dry, TD 4,712 ft., Capps 4,188 ft.

Schleicher County: West Texas Oil & Refining Corp. 1-A Crosby, dry, TD 5,395 ft., elev. 2,264 ft., Palo Pinto 3,876 ft., Strawn 4,728 ft., Ellenburger 5,195 ft.

Tom Green County: Hunt Oil Co. 1 O. D. Weston, Sec. 2, IRR Sur., dry, TD 7,058 ft., elev. 2,136 ft., Palo Pinto 5,540 ft., Strawn 6,052 ft., Ellenburger 7,030 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Castro County: Anderson Prichard Oil Corp. 1 McDaniel, 12-9T-T&NO, dry, TD 9,650 ft., elev. 3,667 ft., San Andres 2,317 ft., Glorietta 3,543 ft., Clear Fork 3,987 ft., Tubbs 4,452 ft., Abo 5,156 ft., Woodford 5,520 ft., Pennsylvanian 7,480 ft., Mississippian 9,220 (?) ft., pre-Cambrian 9,515 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that 2059.14 acres in the Barksdale Air Base, Bossier Parish, Louisiana, will be offered for oil and gas leasing in three parcels, through competive bidding, at 1 p.m. Eastern Standard Time, June 6, 1951, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Oil and Gas Supervisor, U.S. Geological Survey, Box 311, Tulsa, Oklahoma, or from the Director, U.S. Geological Survey, Washington 25, D.C., or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NE¼SW¼, Sec. 18, T. 33 S., R. 40 W., 6th P.M., 40 acres within the known geologic structure of the Hugoton gas field, will be offered for oil and gas leasing, through competitive bidding at 1 p.m., Eastern Standard Time, May 23, 1951, when bids will be opened. Details of lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

Illinois-Ind.-Ky.

Kentucky Wildcat Shows For O'Hara Oil Production

R. E. KUPP and associates have prospects of a small producer in their 1 Toy, a wildcat in the Anthoston area, about 6 miles southeast of Henderson, Henderson County, western Kentucky. At latest report, operators had perforated casing opposite a saturated O'Hara lime zone at 2,357-65 ft. and were preparing to run swab. On a 60-minute drill-stem test of the zone, they got a good showing of gas and recovered 30 ft. of clean oil and 60 ft. of mud-cut oil with no indication of water. Total depth is 2,455 ft. Location, in the SE SW NE 2-O-24, is about 1½ miles northwest of the Niagara pool. Theer is a small Tar Springs well about ¾ mile to the south.

Cox Drilling Co. and Syl Yunker 1 Hicks-Stewart, C NL NE SW NW 1-P-25, second test for the recently opened extension area ¾ mile north of the Zion pool in the same county, flowed clean oil in a drill-stem test of O'Hara lime at 2,184-2,200 ft. Oil was at the surface in 20 minutes. The prospective producer also had saturation in the Aux Vases zone, logged at 2,165-69 ft., where a drill-stem test yielded 90 ft. of clean oil with 150 ft. of oil-cut mud. Casing has been run through both zones to the bottom of the hole at 2,202 ft.

Discovery of a new Aux Vases sand producing area is indicated at the north edge of the Clay City townsite in Clay County, Illinois, where W. W. Toler and Aubrey Tennant recovered 1,280 ft. of clean oil in a drill-stem test at their 1 Manker, SW NE SE 17-3n-8e. Nearest production, ¾ mile to the south, is from Cypress sand. Saturation was logged at 2,912-30 ft. No water was indicated in the test. Bottom-hole pressure was 780 psi. Operators have run casing to 2,916 ft.

A wildcat located 6 miles from other production in northwestern Washington County, Illinois, is showing for a small Silurian well. It is E. A. Obering 1 Baldwin, NE SE SE 15-1s-4w, which yielded 12 ft. of oil, 25 ft. of mud-cut oil, and 60 ft. of oil-cut mud in a 2-hour drill-stem test of Silurian lime topped at 2,323 ft. Test took in an interval at 2,298-2,334 ft. Production tests are under way with hole open below 2,324 ft. Location is 2 miles east of Okaville. Nearest production is in the Bartelso area, southern Clinton County. Production there is from Cypress and Devonian.

T. & H. Corp. 1 Bettenbrock, SE NE SW 36-12n-9w, Vigo County, Indiana, is being put on the pump to open a new Devonian pool just east of the city limits of Terre Haute and 2 miles from other production. Top of the Devonian is 1,609 ft. with saturation in two zones, one logged at 1,625-28 ft. and the other at 1,635-46 ft. In tests of the lower interval, opposite which casing was perforated at 1,633-47 ft., the well swabbed at the rate of 14 bbl. of oil per hour. With plug set at 1,630 ft. and the upper zone perforated at 1,622-31 ft., the well swabbed 11 bbl. per hour. Both zones were acidized, the lower with 500 gal. and the upper with 1,000 gal.

ILLINOIS SUCCESSFUL WILDCAT

Washington County: Thomas S. Doran 1 Szopiniski, NE SE NE 19-3s-1w, IP 20 bbl., Benoist 1,348-54 ft., TD 1,354 ft. (extension Dubois pool).

ILLINOIS WILDCAT FAILURES

Bond County: Ralph N. File 1 Baumberger, NW NW SW 24-6n-4w, dry, TD 1,205 ft.

Barron Kidd 1 Nash, NW NW SE 15-6n-4w, dry, TD 2,767 ft.

Christian County: Sun Oil Co. 1 Clouter, NW NW SE 9-11n-3w, dry, TD 2,210 ft.

Clay County: Calvert Drilling, Inc., 1 Thompson, NW SE SW 28-3n-7e, dry, TD 3,076 ft.

Clinton County: Carter Oil Co. 1 Prather, SW SE NW 3-1n-1w, dry, TD 1,747 ft.

Dale Hopkins 1 Hofsommer, E½ SE SE 12-2n-4w, dry, TD 90 ft.

Gallatin County: John B. Buchman and S. E. O'Neal 1 King, NW NE SW 3-8s-9e, dry, TD 2,090 ft.

Hamilton County: Ashland Oil & Refining Co. and Calvert Drilling, Inc., 1 Stich, NW NW SW 30-3s-6e, dry, TD 3,400 ft.

Jasper County: Mark Twain Oil Co. 1 Payne, NE NE SE 6-2s-2e, dry, TD 2,090 ft.

Montgomery County: Shichman Brothers 1 Smith, NW NE SE 22-7n-2w, dry, TD 1,326 ft.

Richland County: Davis-Johnson and Stanford Oil Co. 1 Legan, SE NE SE 9-2n-14w, dry, TD 3,160 ft.

Ryan Oil Co. and George & Wrather 1 Cowman, SE SE SW 20-3n-14w, dry, TD 3,236 ft.

Wayne County: Tuley & Carter 1 Cisne, SW SE NW 28-2n-7e, dry, TD 3,213 ft.

INDIANA WILDCAT FAILURES

Daviess County: F. L. Runyon 1 Harstreet, E½ NE NE SW 14-4n-7w, dry, TD 998 ft.

Gibson County: Barron Kidd et al 1 Fruendenberg, NE NE SW 30-3s-9w, dry, TD 2,069 ft.

Owen County: W. G. Burrage 1 Glidden, SW SW NE 13-9n-5w, dry, TD 1,330 ft.

Pike County: Cox Drilling Co. et al., 1 McAtee, N½ SW SW SE Projected Section 28-1n-9w, dry, TD 1,100 ft.

Warren County: Roy Meyers 1 Bowlus, SE SE NW 3-31n-8w, dry, TD 858 ft.

SOUTHERN KENTUCKY WILDCAT FAILURE

Cumberland County: Collie Ellis et al 1 W. B. Murley, SE NW 9-C-50, dry, TD 2,300 ft., Lexington lime 384 ft., Tyrone 517 ft., St. Peter 1,218 ft., Knox 1,239 ft., water.

EASTERN KENTUCKY

ASHLAND.—In Pike County sector of Big Sandy gas field, located on John's Creek, Columbian Fuel Corp. has completed 1 Erma Deskins for 342,000 cu. ft. of gas daily from Maxon sand at a total depth of 2,105 ft. A 2-day rock-pressure test gaged 560 psi.

In Magoffin County and on Prestonsburg S. W. quadrangle, Kentucky Ohio Gas Co. is drilling at 2,850 ft. in Corniferous lime topped at 2,388 ft. Shows of gas have been had in this wildcat but nothing commercial to date. Operators plan to drill through the Big Six sand before abandonment. Well is located on Smith Whitaker Tract.

In Martha Pool, Ashland Oil & Refining Co. has announced location for 11 William Lester. Test will be on the west side of the field in an area that has seen but little development in the past few years.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Walter Briney 1 Henton, S½ NW SE SE 24-C-32, dry, TD 870 ft.

Great Lakes Carbon Co. 1 Payne, SL NW SW NE 3-P-32, dry, TD 1,258 ft.

McLean County: R. Hal Compton 1 Mercer, SW NE NE NW 6-K-28, dry, TD 1,795 ft.

Henderson County: Delta Drilling Co. 1

LEGAL

320 ACRES of allotted Indian lands located in Township 1 North, Range 1 West, on the Uintah and Ouray Reservation are being advertised for lease, bids on which will be opened May 22, 1951, at 2:00 P.M. at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from Mr. J. R. Schwabrow, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

Hatchett, W½ SE SE SE 15-O-23, dry, TD 1,804 ft.

Louisiana-Arkansas

Smackover Field Gets New Producing Level

SHREVEPORT.—A. B. Turner et al. resumed operations at the 1 S. R. Saxon, originally finished dry at 6,300 ft., and brought in a new shallow producer in Smackover field of Union County. The test, located in W/2 Lot 2 Section 4-16s-16w, was plugged back to 2,946 ft. where a 10-ft. section was perforated and yielded approximately 200 bbl. of 46°-gravity oil per day. There was no salt water with the flow.

On the western edge of the same county, a new Cotton Valley pool has been opened in the old Wilks field. The discovery is Gotschall Murphy Corp. 1 Gotschall, NE SE 3-18s-18w, a west offset to the field's one well, drilled by Atlantic Refining Co. in 1943 and abandoned in 1946 after producing oil and considerable water from the Smackover lime. The new strike flowed at the rate of 123 bbl. of oil per day on a 15-hour test of perforations at 6,769-6,777 ft. Gas-oil ratio was reported to be low and there was no salt water present. The test was drilled to 7,891 ft. in the Smackover, which failed to yield production.

North Louisiana.—A wildcat in Claiborne Parish had a slight show of gas in the lower Pettit. T. L. James & Co. 1 F. B. King 29-22n-5w, perforated at 5,308-20 ft. and swabbed salt water with a gas show after acidizing with 2,250 gal. Later, perforations were made from 5,210-20 ft. in the upper Pettit, and operator swabbed salt water and dead oil.

South Sarepta field got a good Ardis sand producer last week. Official gage at Sunray Oil Corp. 1 M. A. Northcott, 29-22n-11w, was 278 bbl. of 58.8°-gravity distillate plus 1,460,000 cu. ft. of gas per day. Pay is from perforations at 9,159-9,210 ft. Total depth is 9,219 ft., with 5½-in. producing string set to 9,218 ft. It tested salt water in the Bodcaw sand before completing in the Ardis.

NORTH LOUISIANA WILDCAT FAILURES

DeSoto Parish: Isbrandtsen Co. 1 Porter, SE NW NW 23-12n-13w, dry, TD 6,805 ft., Nacatoch 1,070 ft., Saratoga 1,236 ft., Annona 1,493 ft., Tokio 1,950 ft., Fredericksburg 2,657 ft., Paluxy 2,692 ft., massive anhydrite 4,675 ft., Rodessa 5,010 ft., James 5,460 ft., Sligo 5,860 ft., lower Pettit 6,080 ft., Travis Peak 6,587 ft.

West Carroll Parish: R. R. Brown et al 1 Susie, NE NE NE 26-18n-10e, dry, TD 2,646 ft., Midway 2,212 ft., gas rock 2,479 ft.

ARKANSAS WILDCAT FAILURES

Chicot County: Marvin 2 Cox, SW SW SW 27-16s-1w, dry, TD 3,620 ft.

Johnson County: Pure Oil Co. 1 Low-Capp unit, 753 ft. S and 577 ft. E NWc 17-11n-24w, dry, TD 3,945 ft., base Atoka 1,810 ft., Hale sand 2,025 ft., Petkin lime 2,373 ft., Fayetteville 2,558 ft., Boone lime 2,790 ft., Sycamore 3,072 ft., Penters chert, 3,087 ft., Lafferty lime 3,255 ft., Cason shale 3,414 ft., Ferndale lime 3,424 ft., St. Peters sand 3,465 ft., Everton-Arbuckle dolomite 3,600 ft.

Union County: Lion Oil and Murphy 1 Charles, 100 ft. E C SW SE 28-18s-18w, dry, TD 8,508 ft., Saratoga 2,337 ft., base Tokio 3,207 ft., anhydrite 3,412 ft., James 4,175 ft., Travis Peak 4,585 ft., Cotton Valley 6,044 ft., Jones 8,358 ft., Smackover 8,455 ft.

Oklahoma

Prue Sand Well Proves New Lincoln County Pool

OPENING of a new Prue sand pool in Lincoln County is virtually assured by production tests by Republic Natural Gas Co. at its 1 Stewart, NE NE SW 19-14n-5e. The well swabbed at the rate of 5 bbl. of oil per hour for 6 hours while cleaning, and then kicked off, flowing 100 bbl. of oil in 24 hours through ¼-in. choke. Gravity of the oil is 45° A.P.I.

The well logged more than 35 ft. of effective pay in Prue sand, topped at 3,593 ft. Indicated water level is 3,632 ft. Present production is from 4 ft. of casing perforations at 3,610-14 ft. Before testing the zone, hole had been drilled to a total depth of 4,856 ft. in the second wilcox sand but failed to find any commercial prospects below the present producing zone. Casing was run and hole plugged back to 3,795 ft.

Location of the discovery is about a mile south of the West Davenport pool, which produces from Wilcox sand.

Discovery early this year of the Cushing Lake pool, 6 miles west of Cushing, in Payne County, has been confirmed by completion of the pool's second good producer, a west offset to the discovery well. It is C. E. McCaughey and associates 1 City of Cushing, NE SE SE 28-18n-4e. Producing from 9 ft. of open hole in Wilcox sand at 4,133-42 ft., the well averaged 35 bbl. of oil per hour through ½-in. choke, 21 bbl. per hour through ¼-in. choke, and 14 bbl. per hour through ⅛-in. choke. Bottom of the hole, drilled directionally, is under

THE OIL AND GAS JOURNAL

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A "BUCK"

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Cushing lake. Discovery well was drilled by T. W. and J. M. Loffland.

Mid-Continent Petroleum Corp. has uncovered a new and deeper potential pay zone for the West Moore pool, in Cleveland County. Its 3 Harris, C NE SW 29-10n-3w, a former Wilcox sand producer now being deepened with Arbuckle lime as its objective, found promising showings in the top of the Tulip Creek sand at 9,055-93 ft. A drill-stem test of the zone had gas at the surface within 12 minutes and flowed through ¾-in. surface choke at the rate of 2,000,000 to 5,000,000 cu. ft. per day during the remaining 48 minutes of the test. Flowing pressure was 1,500 psi. at the surface and 3,925 psi. at the bottom. Recovery in the breakdown was 168 ft. of distillate. Old total depth in the Wilcox was 8,828 ft.

Another deep test is being started in southern Roger Mills County, in the far-western part of the state. It will be drilled by Gulf Oil Corp. and Continental Oil Co. as 1 Taylor, with location in the C SE NE 14-12n-23w. Location, 4 miles northeast of Berlin and 7 miles southeast of Cheyenne, county seat, is about 7 miles northeast of a deep test drilled by W. A. Delaney, Jr., and recently abandoned at a total depth of 11,051 ft. It had oil and gas showings in the Hoxbar zone and yielded some oil on production tests but was not considered commercial.

OKLAHOMA SUCCESSFUL WILDCATS

Jefferson County: Dudley and Gorman 1 Seay "B," SE SE SW 20-6s-5w, pumped 74 bbl. 30.1°-gravity oil from sand at 1,737-47 ft., TD; Pontotoc-Cisco 1,389 ft., Cisco-Hoxbar 1,470 ft., Palo Pinto 1,530 ft., Seay 1,737 ft.

Pottawatomie County: Stanolind Oil & Gas Co. and Amerada Petroleum Corp. 1 Badger, SE SE SW 3-7n-3e, flowed 198 bbl. 35°-gravity oil from Hunton at 4,515-35 ft., TD 4,565 ft., Tonkawa 2,205 ft., Belle City 2,606 ft., Hogshooter 3,003 ft., Layton 3,104 ft., Checkerboard 3,325 ft., Wewoka 3,575 ft., Calvin 3,758 ft., Earlsboro 3,856 ft., Mayes 4,354 ft., Woodford 4,406 ft., Frisco 4,491 ft., Bois d'Arc 4,492 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Edwards and Harbour 1 Petty, NE NE NE 23-2s-10w, dry, TD 1,493 ft.

Lincoln County: Davidor & Davidor 1 Parker, SW SW SE 31-13n-5e, dry, TD 4,496 ft.

Creekmore-Rooney et al., 1 Wiedemann, NW SE NE 6-15n-4e, dry, TD 3,895 ft.

Okfuskee County: King 1 Pharoah, SW NW NW 14-12n-11e, dry, TD 3,507 ft.

Okmulgee County: Rebold 1 Miller, SE SE SE 1-15n-13e, dry, TD 1,871 ft.

Pawnee County: McNamar Boiler & Tank Co. 1 Almy, NE NE NW 15-20n-9e, dry, TD 2,340 ft.

Payne County: Kemp 1 Hughes, NE SE NW 1-17n-5e, dry, TD 1,800 ft.

Pottawatomie County: Wise 1 Clemence, NW NE NE 23-11n-5e, dry, TD 4,758 ft.

Stephens County: California Co. 1 Ketchum, SW NE SW 3-1n-9w, dry, TD 3,627 ft.

Tillman County: Johnson 1 Kilgore, NW NW SW 15-2s-17w, dry, TD 4,010 ft., Cisco 2,706 ft., Canyon 3,372 ft.

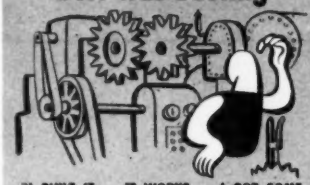
Washita County: Deep Rock Oil Corp. 1 Scott, C SW NE 22-9n-14w, dry, TD 12,022 ft., Blaine 910 ft., Flowerpot 1,140 ft., Wellington 2,900 ft., Pontotoc 4,100 ft., Niles 7,300 ft., ostracod lime 8,290 ft., oolitic lime 8,450 ft., sand 8,660 ft., lime 9,170 ft., Melton 10,783 ft., Deese 11,230 ft.

Youngstown Tube Reelects Officers and Directors

All directors of The Youngstown Sheet & Tube Co. were reelected at a recent annual meeting of shareholders.

The directors reelected all officers with the exception of J. C. Argetsinger, who resigned as vice president.

Bert was Beefing



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ALL GENUINE

McGREGOR

PLUNGER BARRELS AND VALVES ARE STAMPED

"McGregor Working Barrel Company"

LOOK FOR THE NAME

BEST BY TEST

Cup on top keeps sand from setting around working barrel. M-nipple takes place of old barrel. Will not stick. You save money and labor. Eliminate pulling the tubing.

Send for Booklet

McGREGOR WORKING BARREL COMPANY

Bradford, Pa. U.S.A.

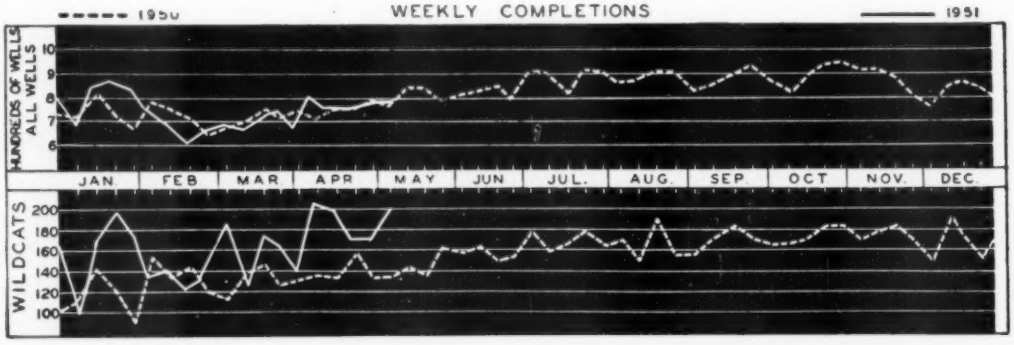
CURRENT STATISTICS

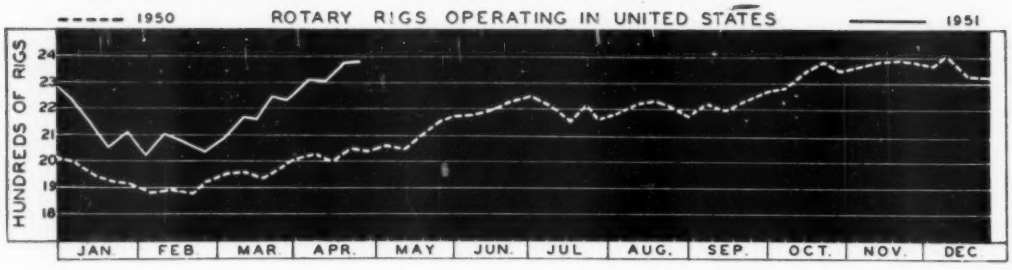
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 5, 1951

	Total of all wells					May 5		Wildcat completions and discoveries										
													Cumulative total, 1951					
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	5	0	*4	13,104	138	184	0	0	0	0	0	0	0	0	0	0
Pennsylvania	9	4	1	†4	16,558	263	347	0	0	0	0	0	0	0	0	1	1
West Virginia	10	0	7	3	36,875	192	214	0	0	0	0	0	0	0	5	2	7
Ohio	18	8	3	‡7	28,880	231	307	0	0	0	1	1	1	0	3	12	16
Indiana	16	8	0	8	26,113	321	379	0	0	0	5	5	8	0	1	75	84
Kentucky	22	7	4	‡11	38,931	279	292	0	0	0	5	5	3	0	1	45	49
Illinois	50	14	0	36	130,485	553	710	1	0	0	13	14	12	0	0	97	109
Michigan	13	3	1	9	35,392	229	250	0	0	0	6	6	7	0	4	92	103
Kansas	64	26	5	‡33	207,616	1,380	1,179	3	0	2	18	23	63	0	6	262	331
Nebraska	6	1	1	4	22,163	97	21	0	0	0	4	4	2	0	1	47	50
Oklahoma	97	48	3	‡46	364,235	1,860	1,745	2	0	0	11	13	70	1	8	244	323
Texas	372	209	12	151	1,697,345	5,534	5,381	24	0	2	83	109	237	22	35	1,041	1,335
North Central (Dist. 7-B & 9)	120	46	0	‡74	365,162	1,680	1,674	13	0	0	41	54	120	0	5	443	568
West (Dist. 7-C & 8)	133	107	0	26	708,163	1,705	1,573	5	0	0	15	20	44	6	1	209	260
Panhandle (Dist. 10)	13	6	5	2	44,837	241	350	0	0	0	1	1	0	0	0	11	11
Eastern (Dist. 5, 6, & 6-P)	19	12	0	7	94,466	386	380	1	0	0	1	2	2	3	0	70	75
Gulf Coast (Dist. 2 & 3)	50	25	3	22	299,216	761	731	3	0	1	16	20	39	9	23	144	215
Southwest (Dist. 1 & 4)	37	13	4	20	185,501	761	667	2	0	1	9	12	32	4	6	164	206
Louisiana	28	13	2	13	115,607	673	809	1	0	0	3	4	17	0	4	89	110
Northern	17	7	2	8	27,180	333	422	0	0	0	2	2	4	0	3	46	53
Southern	11	6	0	5	88,427	340	387	1	0	0	1	2	13	0	1	43	57
Arkansas	4	1	0	3	18,408	130	121	0	0	0	3	3	3	0	1	26	30
Mississippi	7	4	0	3	47,610	84	115	0	0	0	1	1	4	3	0	31	38
Southeastern States	3	0	0	3	17,570	28	21	0	0	0	2	2	0	0	0	11	11
Montana	5	2	0	3	11,358	71	49	0	0	0	1	1	0	0	0	19	19
Wyoming	10	5	1	4	52,092	229	183	0	0	0	1	1	4	0	0	35	39
Colorado-Utah	2	1	0	1	8,837	86	22	0	0	0	0	0	2	0	2	42	46
New Mexico	0	0	0	0	0	219	232	0	0	0	0	0	5	0	5	24	34
California	38	30	0	8	133,846	683	572	1	0	0	7	8	16	0	1	138	155
Miscellaneous	0	0	0	0	0	15	6	0	0	0	0	0	0	0	7	7	14
Total United States	783	389	40	354	3,023,025	13,345	13,139	32	0	4	164	200	454	26	84	2,340	2,904
Total previous week	777	425	32	320	3,021,872			24	3	3	140	170	422	26	80	2,176	2,704
Total May 5, 1950	766	448	52	266	2,788,535			16	3	6	109	134	327	24	72	1,949	2,372

Service wells included: *4, †3, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

	May 5 crude oil	B. of M. May demand	Apr. 28 crude oil
Alabama	3,050	2,500	2,950
Arkansas	77,850	84,000	77,900
California	964,700	970,000	935,100
Colorado	79,800	78,000	78,300
Eastern	58,300	64,000	58,200
Florida	1,675	1,600	1,750
Illinois	166,400	163,000	159,700
Indiana	29,300	30,000	28,300
Kansas	317,200	303,000	320,100
Kentucky	26,800	30,000	26,700
Louisiana	610,600	632,000	609,875
North Louisiana	114,900		114,950
South Louisiana	495,700		494,925
Michigan	39,900	42,000	43,100
Mississippi	98,350	106,000	99,300
Montana	25,100	24,000	24,900
Nebraska	9,250	10,000	9,400
New Mexico	143,100	140,000	143,850
Oklahoma	508,950	505,000	505,400
Texas	2,743,600	2,500,000	2,725,375
Dist. 1 (Southwest)	33,725		33,525
Dist. 4 (Southwest)	256,900		254,350
Dist. 2 (Gulf Coast)	164,350		162,325
Dist. 3 (Gulf Coast)	432,575		481,825
Dist. 5 (Eastern)	52,200		51,475
Dist. 6 (Eastern)	112,950		111,575
East Texas field	274,500		279,000
Dist. 7-C (West)	95,200		91,725
Dist. 8 (West)	944,800		935,900
Dist. 7-B (W. Central)	85,200		83,425
Dist. 9 (N. Central)	152,300		150,250
Dist. 10 (Panhandle)	88,900		89,700
Utah	3,600	5,000	3,500
Wyoming	200,300	180,000	200,400
Total United States	*6,107,825	5,870,000	6,084,150
Change from previous week, up	23,675		
Canada	63,905		85,760

Total U. S. production January 1-May 5 †740,558,490 bbl.
Same period last year (crude plus cond.) 620,812,955 bbl.

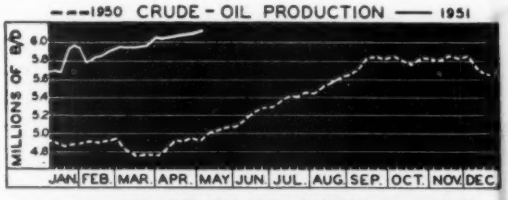
*Not including 110,280 bbl. condensate. †Including 13,399,260 bbl. condensate

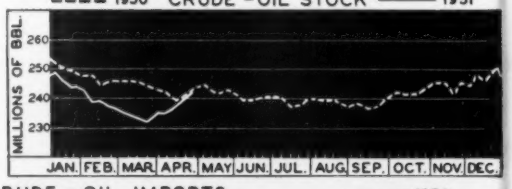
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

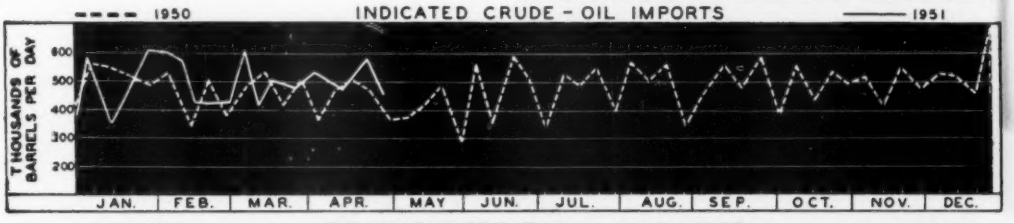
(Thousands of barrels)

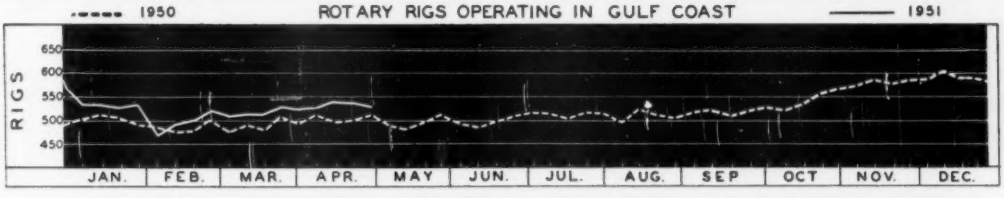
	Apr. 28, 1951	Apr. 21, 1951	Apr. 29, 1950
Pennsylvania Grade	2,077	2,051	2,858
Other Appalachian	1,630	1,465	1,724
Illinois, Indiana, Michigan	10,395	9,751	9,008
Arkansas	2,605	2,794	3,057
Louisiana	14,679	14,234	15,321
North	2,988	2,933	3,405
Gulf	11,691	11,301	11,916
Mississippi	3,226	3,136	2,456
New Mexico	6,975	6,918	6,368
Oklahoma and Kansas	37,251	36,906	35,535
Texas	112,437	110,420	110,011
East Texas	14,485	14,218	15,240
West Texas	45,494	45,264	39,803
Texas Gulf	24,958	23,670	27,580
Other Texas	27,500	27,268	27,388
Rocky Mountain	13,380	13,433	13,519
California	29,908	30,072	37,423
Foreign	7,916	8,010	7,464
Total	242,479	239,190	244,744

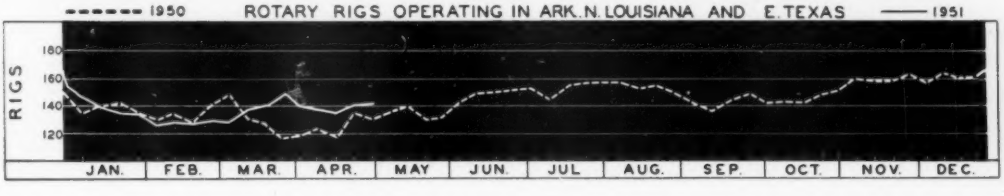
*Bureau of Mines.









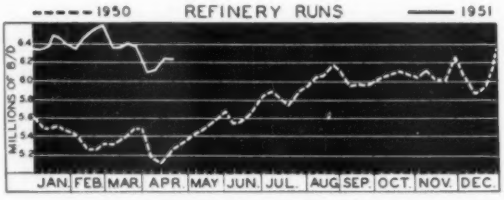


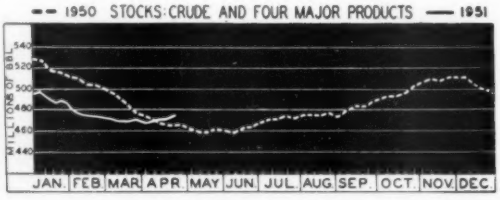
A.P.I. REFINERY REPORT, APRIL 28

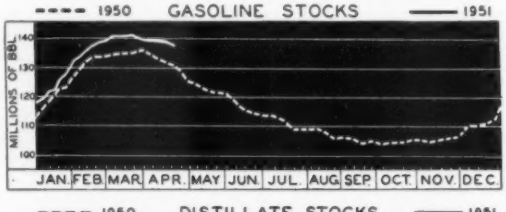
(Thousands of barrels)

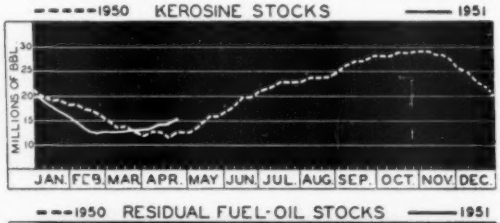
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, April 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,016	369.7	48.7	210.3	234.0	27,309	6,595	13,238	8,660	871	360.0	34.4	172.9	201.4
Appalachian:														
District 1	105	39.7	6.7	15.3	12.0	3,085	290	459	253	88	37.0	7.4	11.9	10.7
District 2	81	33.6	3.7	15.4	16.3	1,529	99	182	130	72	32.6	4.4	9.0	15.9
Ind., Ill., Ky.	1,153	596.3	84.9	191.1	173.0	31,511	2,719	7,229	2,973	935	470.1	63.0	155.0	151.9
Okla., Kans., Mo.	506	270.3	20.7	106.3	65.6	16,268	746	5,227	990	430	241.0	19.0	88.8	58.1
Inland Texas	217	130.3	11.7	41.7	38.7	3,682	309	624	691	193	132.6	11.5	23.5	39.7
Texas Gulf Coast	1,464	659.8	121.6	277.7	257.4	21,337	2,343	5,293	4,101	1,081	531.9	83.8	226.3	195.0
La. Gulf Coast	483	215.1	65.7	104.3	50.6	6,972	1,566	2,207	1,301	442	231.7	51.6	98.3	44.7
N. La. and Ark.	82	31.0	9.0	19.0	8.1	2,957	233	759	66	70	25.3	7.0	15.0	12.4
Rocky Mountain:														
New Mexico	15	8.3		2.9	3.0	97	20	58	32	14	7.7	0.4	2.3	3.5
Other Rocky Mtn.	175	93.4	2.4	33.7	39.3	5,577	180	1,189	680	157	73.4	2.4	31.8	33.4
California	939	391.9	10.3	133.9	351.6	17,150	535	7,394	16,203	840	364.6	10.1	141.9	274.1
April 28, 1951	6,236	2,839.4	385.4	1,151.6	1,249.6	137,474	15,635	43,859	36,080	5,193	2,507.9	295.0	976.7	1,040.8
April 21, 1951	6,265	2,865.7	396.9	1,167.4	1,228.7	138,891	14,698	42,957	35,899					
April 29, 1950	5,314	2,576.9	289.9	933.0	1,038.9	128,655	12,825	36,686	39,260					

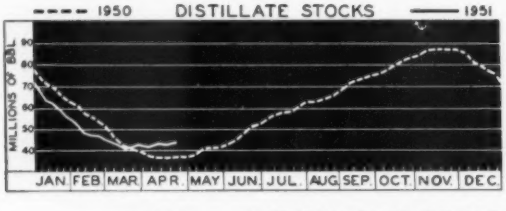
*At refineries including natural blended. †Finished and unfinished.

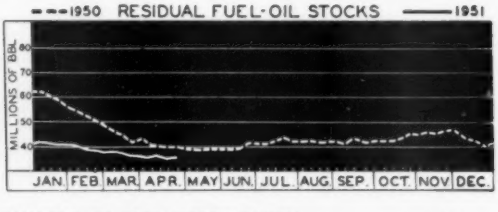


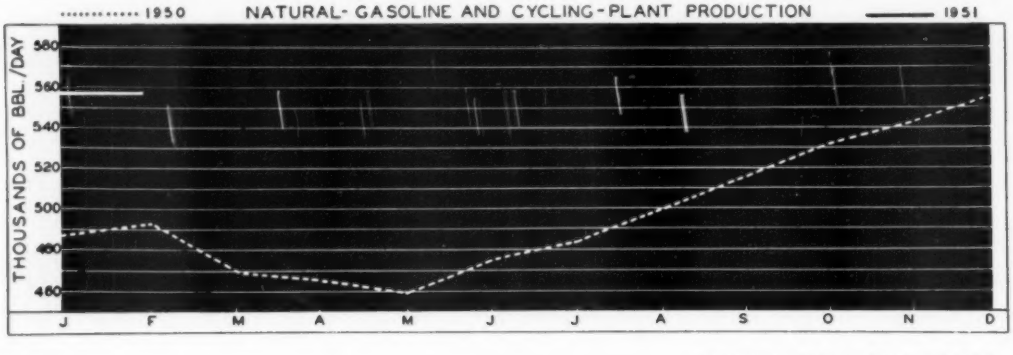












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.33
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
East Texas	$2.65
Kettleman Hills, California*	2.30
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

SUPPLIERS report big increases in the movement of gasoline out of primary storage in the Mid-Continent and North Central areas for the first week of May. The increase has been particularly noticeable in the takings of pipe-line gasoline. Some of the larger suppliers are reported to be moving material contracted or purchased earlier in the season.

In some cases, gasoline sales have been below normal in the area because of delayed farm demand. Also, it is believed that some resellers waited until the first of May to build up stocks for the season. Compared with last year, gasoline stocks in these inland areas have gained more than for the country as a whole. In the Mid-Continent and North Central refining districts, total gasoline stocks on April 28 amounted to 47,779,000 bbl. compared with 40,840,000 bbl. at the end of April 1950. This represents an increase of 17 per cent compared with a gain of 10.7 per cent for all areas east of California and 7.4 per cent for total United States. At the end of February, these inland stocks were up 9.5 per cent over previous year compared with an increase of 7.6 per cent for east-of-California stocks. The increase in gasoline sales for May is expected to bring inland stocks nearer to last year's level.

Reports from heating-oil areas of the New England states indicate that marketers are starting a drive to get consumer tanks filled before the first cold weather to avoid supply shortages next winter. Special attention should be given to early-summer sales to provide an even flow of heating oils from refineries so that crude runs can be maintained at a level high enough to meet the expected winter demands.

Coastwise tanker rates for dirty vessels dropped below Maritime Commission base plus 100 for the first time this year with the report of a fixture at MC plus 97 for early May.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 7, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10⅓	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11⅓	13.5-13.75	11¾-12
42-44 w.w. kerosine	9⅛-9⅜	10	8½-9
No. 2 straw fuel oil	8¼-8⅜	9	7½-8
No 6 residual	$1.75-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

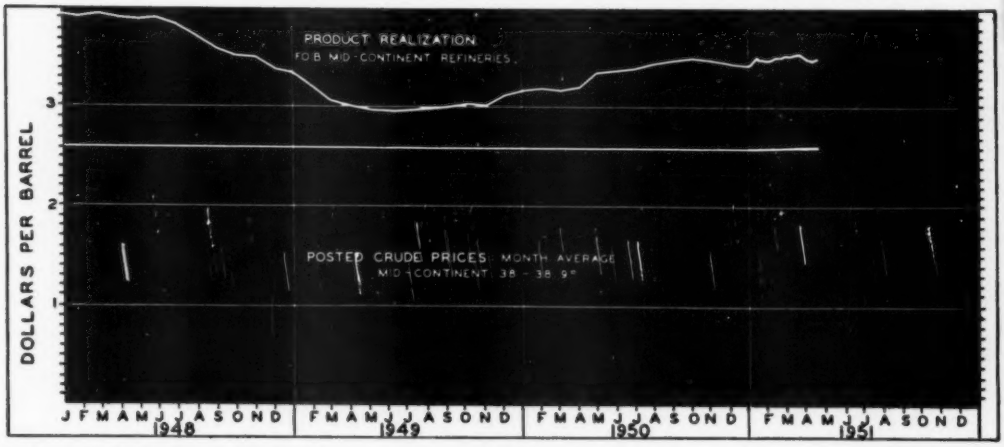
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	33.5
180 vis., 0 p.t. neutral	31.5

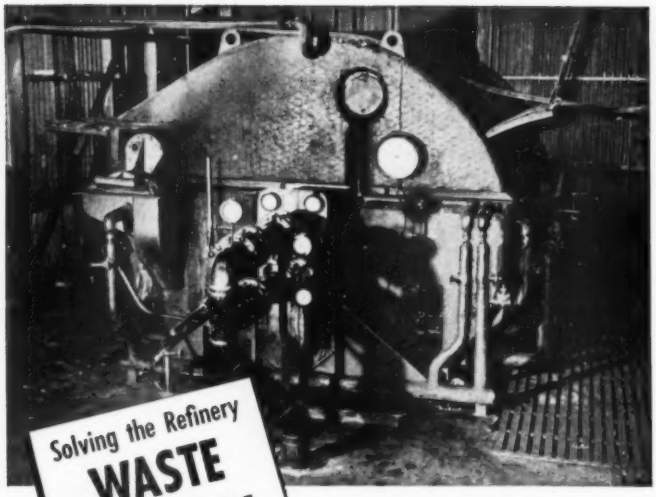
WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT, 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.50 for week ended April 28, $3.48 for previous week, and $3.24 for April 1950.



Solving the Refinery

WASTE DISPOSAL PROBLEM

. . . automatically, economically!

OLIVER PRECOAT FILTER

Trap residues—separator box emulsions—sludges . . . the Oliver Precoat Filter can effectively handle these wastes by dewatering sludges and breaking oil-water emulsions, resulting in stocks for refinery re-run and water ready for disposal in public streams. For example, a refinery is obtaining an oil phase carrying only 2/10 of 1% sludge and only a trace of water; the water phase is comparatively oil-free.

Oliver United engineers, calling on their 42 years of filtration experience and their many varieties of filter types, developed this closed type, continuous vacuum precoat filter for handling refinery wastes. It's proving a boon to refineries in connection with this vexing problem.

A letter or phone call to our nearest office will have a skilled refinery filtration engineer at your plant whenever desired to make a study and recommendations for a filtration plant to handle the wastes properly.

• • •

Another very profitable use of the Oliver Precoat Filter in refineries is in connection with contact clay handling. Many are in service providing continuous handling, great reduction in oil losses over other methods, and more easily handled cake.

OLIVER UNITED FILTERS INC.

New York—33 West 42nd Street
Chicago—221 N. La Salle Street
Oakland—2900 Glascock Street
San Francisco—260 Calif. Street
Factories: Hazleton, Pa. • Oakland, Calif.
Export Sales Office—New York

Cable—OLIUNIFILT

MERCOID

OFFERS A LINE OF DEPENDABLE CONTROLS FOR VARIOUS INDUSTRIAL REQUIREMENTS

THE ONLY 100% MERCURY SWITCH EQUIPPED CONTROLS THEY ASSURE ACCURACY, BETTER PERFORMANCE AND LONGER CONTROL LIFE

Wherever the control of temperature, pressure, liquid level or mechanical operations are involved, Mercoid Controls and Switches assure a maximum in efficient and dependable performance.

PRESSURE CONTROLS
Available for numerous industrial applications. They are equipped with Bourdon tubes and have outside double adjustments which eliminate guesswork when setting controls. Indicators show the operating range on the calibrated dial.

REMOTE STEM TEMPERATURE CONTROLS
For control of liquids or gases, such as air, oil, water, paraffin, glue or distillate vapors and many other industrial applications. A heavy gauge Bourdon tube is employed which is actuated by the expansion of volatile liquid within the remote bulb. The control is equipped with convenient outside double adjustments.

LEVER ARM AND FLOAT CONTROLS
Mercoid lever arm controls have a variety of applications where it is desired to mechanically open and close electric circuits. Mercoid float controls are used for maintaining fluid levels in tanks or for control of sump pumps or cellar drainers.

LINE VOLTAGE THERMOSTAT
The No. 855 thermostat is used for line voltage applications where it is desired to handle the full motor load directly without the use of a relay. Available with "on-off" manual switch for unit heater applications. These thermostats are used for both heating and refrigeration applications.

TRANSFORMER-RELAYS
Type V is a reliable low voltage mercury contact relay which also acts as a transformer inducing low voltage (24 volts) on the pilot circuit. There is no hum or chatter. Used for all types of automatic equipment. Available in various voltages, cycles and circuits.

MERCURY SWITCHES
Mercoid brand switches are noted for their superior operating qualities. Various types available.

MERCOID CONTROLS are available in a variety of types for sensitive control of Pressure, Temperature and Lever actuation.

Write for further information.

THE MERCOID CORPORATION
4201 BELMONT AVE. ★ ★ CHICAGO, ILL.

EQUIPMENT MEN . . . in the News

Leisenring Named Pacific Coast Sales Manager

H. D. LEISENRING

W. G. Moser, general sales manager, meter division of A. O. Smith Corp., has announced the appointment of H. D. Leisenring as sales manager of the Pacific Coast area.

Leisenring, formerly sales manager of Pittsburgh Meter Co., has over 20 years' experience in engineering and sales of service-station pumps and petroleum meters.

Black, Sivalls & Bryson Announces Promotions

According to a recent announcement by Floyd C. Myers, manager of branch operations for Black, Sivalls & Bryson, Inc., H. A (Andy) Shaw has been made manager of the Oklahoma City branch succeeding C. W. (Jeff) Thomas, recently resigned.

James W. Forney has recently joined B.S.&B. and will be stationed at the Blackwell, Okla., branch as a field sales and service man. B. W. Bourne, field salesman at Midland, Tex., has recently been transferred to the B.S.&B. office at Tulsa as city sales manager. Rex A. Vicars, sales engineer, has been transferred to B.S.&B. regional sales office at Midland.

Lloyd M. Petrie, Jr., recently joined the engineering staff of B.S.&B. as chemical engineer. He has now been transferred to Odessa, Tex., as sales and service representative. Walter L. Slay has been transferred from Shreveport to Magnolia, Ark., where he will be in charge of a subbranch. Gene W. Beery has been promoted to the position of manager of B.S.&B.'s subbranch at Carmi, Ill.

Norman Korn, sales engineer, has recently been transferred to the company's branch at Sidney, Neb. Edwin A. Rhodes has been promoted to manager of the company's branch at Powell, Wyo.

R. B. Francis Mallett has recently been employed by B.S.&B., and will serve in the capacity of sales and service representative at its Hobbs, N. M., branch. Ray D. Canada, former subbranch manager at Magnolia, Ark., has been transferred to the company's branch at Snyder, Tex., in the capacity of field salesman. Charles L. Little, Jr., recently employed by B.S.&B., will be stationed at Shreveport in the capacity of sales engineer. Paul V. Hays has been promoted to the position of assistant branch manager at Casper, Wyo.

John Zink to Hold Second Process-Heating Seminar

A second process-heating seminar is being planned by John Zink Co. for engineers and operating personnel from the refining and chemical process industries, to take place on May 26 at its Tulsa plant.

A program of four papers and a question-and-answer period before a panel of experts representative of major engineering companies will complete the technical session. A non-technical session will follow during which the entire group will be guests of John S. Zink at a buffet dinner.

Attendance at the seminar is by invitation only, which may be had by writing or telephoning John Zink Co., P. O. Box 7216, Tulsa. Any who desire to attend may do so by making reservations.

Schlumberger to Use Boat For Servicing Oil Wells

Schlumberger Well Surveying Corp. has announced a new means of servicing oil wells in the lakes and marshes of south Louisiana. The company's well-servicing equipment has been mounted on a shallow-draft, 64-ft., steel boat. The boat is powered

by twin-screw diesels and will operate in the shallow-water area, which has formerly been completely serviced by trucks transported to and from the wells by barges.

The boat used will carry a full complement of the electrical apparatus necessary to perform all of the services now being offered by the company. It will be under the management of Don Mitchell, senior engineer.

Claude Spencer Joins Natasco Organization

Claude E. Spencer has joined Natasco Co., according to an anouncement by Howard L. Berkey, president.

Spencer spent 23 years with Sinclair Pipe Line Co., which later became Stanolind Pipe Line Co., and more recently Service Pipe Line Co., before affiliating with Natasco. He specialized in welding, tank maintenance, and construction.

De Laval Names Nilsen Texas District Manager

T. A. NILSEN

De Laval Steam Turbine Co., of Trenton, N. J., has appointed T. A. Nilsen as district manager of a new district office recently opened in Houston.

A. N. Sarich, for several years the De Laval southwest technical representative in Oklahoma and Texas, will continue in the same capacity with headquarters in Houston.

De Laval has long been associated with Texas industry handling centrifugal blowers for catalytic cracking plants, mechanical-drive steam turbines for refineries and process plants, centrifugal pumps for all services, IMO rotary pumps for many oil-handling services, and power-transmission equipment.

Rockwell Strengthens Nordstrom Sales Staff

A. J. Kerr, vice president of sales, meter and valve division, Rockwell Manufacturing Co., has announced several personnel changes.

E. E. Matheson has been appointed to the Oakland, Calif., plant. In his new capacity Matheson will establish headquarters at Rockwell's Nordstrom valve plant in Oakland, where he will assist the factory management by acting as liaison between production, engineering, and sales. H. Gottward was named as general sales manager for Nordstrom valves. Previous to this appointment he served as assistant sales manager of Nordstrom valves and assistant vice president of the meter and valve division.

R. R. Bush has been made oil-field products sales manager. He was employed by Texas Pipe Line Co. before joining Rockwell in 1934 as a sales

engineer for the Tulsa district. O. W. Barnett will be sales manager of warehouse and jobber sales. He joined the company in 1934 and was assigned to field work in Oklahoma and Louisiana. In 1950 he was appointed gas products sales supervisor in the Tulsa area and later became assistant sales manager for the Nordstrom division.

D+B Transfers Key Offices to Garland, Tex.

In a move better to centralize its operations, D+B Division, Emsco Derrick & Equipment Co., is transferring its executive, engineering, advertising, pricing, and export offices to the company's new plant at Garland, Texas. D+B Mid-Continent sales offices were previously located there.

William C. (Bill) Kinder, vice president in charge of the D+B Division, was recently moved from Los Angeles to Garland. He has been with D+B Division of Emsco since 1939 when he joined that group after spending 6 years with Republic Supply Co. of California handling subsurface pumping equipment sales. He has directed D+B operations since 1941.

Beacon Names Supply Distribution Manager

Leo J. Wilmeth, Jr., has been appointed manager of supply and distribution for Beacon Petroleum Co., Tulsa. He has had wide experience with other companies specializing in liquefied petroleum products.

Wilmeth's assignment with Beacon is the supervision of the movement of petroleum products handled by the company.

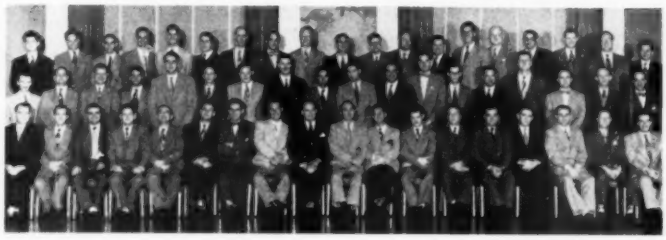
Well Instruments Names S.I.E. Canadian Representative

Well Instrument Developing Co. has announced the appointment of Southwestern Industrial Electronics Co., Calgary, Alta., Canada, as its representative in Canada. S.I.E. will handle the sale and repair service of Widco electric loggers.

Widco loggers are designed to give electric logs in core holes, shot holes, water wells, and shallow production wells where a two-curve electric log is sufficient.

The Canadian branch of S.I.E. is headed by Emmet House.

Schlumberger Conducts Study Conference in Houston



The second in a series of industry-wide conferences in well logging was conducted by Schlumberger Well Surveying Corp. the latter part of March at Houston. Those attending came from oil regions throughout the United States, Canada, and South America. Attending this meeting were: (front row) C. H. Blackburn; J. T. Foster, R. J. Yakupsack; J. A. Williams; B. R. Leeds; E. D. Haymon; G. H. Fentress; R. B. Benway; J. A. Maurer; B. F. Patterson, Jr.; W. D. Fugler, Jr.; O. D. Stevens, Jr.; Leroy Gideon; John D. Henderson; C. J. Cunningham; W. B. Junod; R. E. Lee; and M. P. Tixier. (Second row) P. E. Reynard; W. E. Harkness, Jr.; Chet Doyle; A. H. Curren; J. P. Byrne; W. D. Ford; D. M. Quillan; Will H. Knight; E. H. Culbertson; R. M. Caywood; Rush George; E. W. Sengel; C. D. Jones; A. L. Richards; Charles E. Phillips; G. P. Stringer; T. C. Cash; and A. M. Allegret. Third row: J. A. Ricard; C. D. McMurrey; R. M. Chatham, Jr.; L. C. Schmidt; M. B. Morris; D. G. Swiers; F. M. Purcell; R. E. Hamilton; D. E. Edstrom; W. M. Pickles; E. S. Scholl; P. Gaines; E. M. Gurnea; R. C. Hagens; J. M. Gibson, George M. Yoder; John D. Mullins; C. G. Koe; and R. R. Dutka.

Dia-Log Opens Houston Office, Shop Building

B. R. McNulty, vice president and manager of the Mid-Continent division of Dia-Log, has announced the completion of Dia-Log's new Houston office and shop building. These facilities will serve as Dia-Log's Mid-Continent division headquarters and operating offices for the Houston district.

The opening of the Houston office makes a total of 16 strategically located offices where Dia-Log electric line truck services are available.

Brown Named to Sales Post by Pacific Pumps

E. J. Weis, vice president and director of sales of Pacific Pumps, Inc., Huntington Park, Calif., has announced the appointment of W. E. Brown as sales engineer for the Los Angeles district.

Since coming to California 5 years ago Brown has become well known throughout the industry through his activities in engineering design and sales engineering.

J. B. Gill Establishes Headquarters in Tulsa

J. B. Gill Co., a California engineering and construction firm, has established its Mid-Continent division headquarters in Tulsa.

This activity under the direction of Harry R. March, resident manager, will function as an independent organization offering a complete, integrated engineering and construction service to the oil industry, as well as to the petrochemical, steel, and associated heavy manufacturing industries.

Oilwell Names Johnson Engineering Consultant

Edward W. Johnson, formerly manager of the centrifugal-pump department of National Transit Pump & Machine Co., Oil City, Pa., has been named consultant on centrifugal pumps at Wilson-Synder manufacturing division of Oil Well Supply Co., Braddock, Pa.

Johnson joined Oilwell in October 1950 with a wide background of experience in engineering and design. He spent 7 years with the engineering department of Gulf Refining Co. refinery at Port Arthur, Tex., and from 1940 to 1945 he served as chief mechanical engineer for The Texas Co. refinery at Port Arthur. He became connected with National Transit Pump & Machine Co. in 1945.

Keffer, Rice Transferred By Continental Supply

James E. Keffer, former store manager for Continental Supply Co., McCamey, Tex., has been transferred to San Angelo, Tex., in the same capacity.

Alvin L. Rice, former floorman at Odessa, Tex., has been transferred to McCamey as store manager.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE: 17½" Oilbath Gumbo Buster Rotary Table. 2—6" Gumbo Buster Swivels. Melton Supply Company, Seminole, Oklahoma.

ONE Landis Model-27 crank shaft grinder, size 20" swing by 72" centers with 30" diameter grinding wheel and individual motor drive. Like new condition—Bargain! Acme Screw Products Co., 1537 East 7th St., Tulsa, Oklahoma. Phone 2-5477.

125 KW, 514 RPM, 3-phase, 60-cycle, 480 volts, Engine Type, Electric Machinery Generator, direct connected exciter. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

7½ X 10 Ajax oil engine like new. Used one year. Just completed overhaul and painting. $1500.00 F.O.B. McPherson, Kansas. Jay Kornfeld, 1121 Union National Bank Building, Wichita, Kansas. Phone 4-2121. 6-0996.

IMMEDIATE SHIPMENT

2000 ft. 16" OD 65# H-50 8RT Range 1 & 2 No. 1 Used Seamless Casing
10000 ft. 2⅜" OD 4.70# J-55 8RT Range 2 No. 1 EUE Seamless Tubing
7000 ft. 2⅞" OD 6.50# Ditto
1400 ft. 10¾" OD 40.5# No. 1 Used Lapweld Casing.

FRANK MORRIS & COMPANY
SPECIAL REPRESENTATIVES—TUBULAR PRODUCTS
424 So. Cheyenne Tulsa, Oklahoma

FOR SALE

New at East Chicago, Indiana, 3 BS&B Catalytic Converters Complete, 4' ID x 28' Ser. #2856T1, 2 and 3, Shells ½" thick ASTM—A 70 Flg. quality steel, Tube Sheets 10¼" Thick same steel, cover plates 7⅜" thick ASTM—A 212 Fire Box quality, 48—5" OD x 26' x ⅜" Seamless Tubes A-106-39 Grade "B", Shell Design Pressure 60# PSIG, Test 90#. Tubes and Heads 1100# PSIG, Test 1650#. Full data and price on request.

CITIES SERVICE OIL
Patridge, Bartlesville, Oklahoma

FOR SALE
SEAMLESS OIL WELL CASING

1300' New H-40 5½" O.D., 14# 8 R.T., R.2 (One car FOB S.W. Michigan)
2450' A-1 Used H-40 5½" O.D., 14# 8 R.T., R.2 (One car FOB S.W. Michigan.) Excellent condition—protectors.
3000' A-1 Used Grade C 5½" O.D., 14# 10 V.T., FOB S. W. Michigan (Good condition, attractively priced).
6000' New & Used H-40 7" O.D., 17# 8 R.T., R.2 FOB Cen. Michigan. (Used 6 months, thr. protectors).
9000' A-1 Used Grade C 5½" O.D., 17# 10 V.T., R.2 FOB Cen. Mich.

Additional offerings new and used material, including upset tubing. Inquiries invited.

MICHIGAN CARLON PIPE CO.
20120 Livernois Avenue, Detroit 21, Mich.
DI-amond 1-1400

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

FOREIGN SEAMLESS CASING

A. P. I. Specifications. Subject to letter of credit. Box D-981, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1 RL Cardwell, double drum, with four-legged mast. In good working condition, now working. Box 871, Seminole, Oklahoma.

WELL EQUIPMENT: New and used spudders, rotaries, core drills—all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted. Immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT FOR SALE

2—Identical Electric Machinery Manufacturing Company Generators, 60 KVA, 40 KW, 480V, 60 AMP, 1200 RPM, 3 Phase, 60 Cycle, each powered by a Buda Model L525 natural gas or gasoline engine and each cooled by a Young Happy Model 36 Full Flow Engine Jacket Water Cooler. Horsting Oil Company, P. O. 388, Driscoll, Texas.

FOR SALE
LOW PRESSURE GASOLINE PLANT
(Complete)

80 hp. Clark Engines
Fractionators — Scrubber tanks
Stills — Boilers
Cooling Towers — Buildings
Storage Tanks — Houses and Land
Worthington 2-stage compressors
—Belt Driven

All types of equipment pertaining to gasoline plant.

Located near Depew, Oklahoma

For further information contact

Bankoff Pipe & Supply Co.
823 N. Lewis Phone 4-2119
Tulsa, Oklahoma

BUY NOW FOR YOUR SPRING REQUIREMENTS
LARGE QUANTITIES — IMMEDIATE DELIVERY

LINE PIPE

270,000' ½" Standard Black Welded Plain End, 21' Lengths
30,000' 2" Standard Black Welded Plain End, 21' Lengths
20,000' 2¼" OD x .140" Wall 3.2# Recond. Seamless Tubing (Sub. 2" Std.)
22,000' 7" OD 17# & 20# Used Lapweld Casing (Sub. 6⅝" or 8⅝" OD Line Pipe)

TUBING AND CASING

25,000' 2⅜" OD 4# Good Used Lapweld Range 1 T&C Tubing, 11½ V-Threads
5,000' 2⅜" OD 4# Good Used Lapweld Range 1 T&C, New 10 Round Thread
15,000' 2⅜" OD 4.6# Once Run Seamless Range 2 Tubing, 10 Round Thread
4,000' 2⅞" OD 6.4# Once Run Seamless Range 2 Tubing, 10 Round Thread
5,600' 5½" OD 15# Good Used Lapweld Casing, Range 1, 11½ V-Threads
4,500' 5½" OD 14# Good Used Seamless Range 1 & 2, 10 V-Thread
5,500' 5½" OD 17# Good Used Lapweld Casing, Range 1, 11½ V-Threads
15,000' 7" OD 17# Good Used Lapweld Casing, Range 1, 10 V-Thread
7,800' 7" OD 20# Good Used Lapweld Casing, Range 1, 10 V-Thread

SUBJECT TO PRIOR SALE

OTHER SIZES NEW AND USED CASING, TUBING, LINE PIPE AND SEAMLESS TUBING . . . MANY SIZES SUITABLE FOR GAS, OIL, WATER FLOW LINES. FOR FULL DETAILS, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

EQUIPMENT WANTED

FOR SALE: New Buda Gas-Gasoline Oil Field Power Units, Models 4MO-645 & 6MO-893, for complete details write Box 248, Mt. Pleasant, Michigan.

CORE DRILLS. Longyear UG nearly new, Waukesha engine, Gasco Pump, complete outfit with 700′ drill stem, 2½ ton GMC truck. Also Franks #1000 mounted Chev. truck. Pressey & Son, Pueblo, Colo.

ROTARY FOR SALE: We have 2 rigs—will sell either. 1 Brewster CR 300 with 4,200 feet 3½″ drill pipe. 2 Compounded GAK Waukesha Motors. 1 U-10 Unit Rig with 4,400 feet 4½″ drill pipe. 7¼x12 Gardner-Denver Pump. 2 JL 1335 Buda Motors Compounded. Both rigs are in first-class condition and fully equipped ready to go. A. D. Allison & Co., Inc., 715 Brown Building, Wichita 2, Kansas.

EQUIPMENT FOR SALE

FOR SALE—At Bartlesville, 1—Standard Six Unit Todd Check Signer with Stacker, $150.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Approximately 500′—13# O.D. Seamless Casing and 200′—13″ O.D. Lapweld Casing $4.50 per foot. Located near Falls City, Nebraska. Contact Herman Sill, White City Motel, Falls City, Nebraska.

FOR SALE OR TRADE: 16000′ New 7″ OD 20# J-55 R-2, 8R, seamless casing. Big Mill Pipe. Sabine Machine & Supply Co., Phone 3094, P. O. Box 111, Kilgore, Texas.

FOR SALE: At Madison, Kansas, 1—Model FS-35 Cardwell Skid Type Oil Field Servicing Unit, $750.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

EQUIPMENT FOR SALE

IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

FOR SALE: Approx. 1,500′ 7″ O.D. 10V thread, 22 lb., Range 1, lapweld, good condition, $1.85 per foot our yard. Great Bend Pipe & Supply, Great Bend, Kansas. Phone 4306.

WAR SURPLUS EQUIPMENT
2½ to 25 Kw Light Plants, Byron Jackson Pump Units, Gaso Pump Units, Hale Fire Pump Units, Stewart-Warner Heater Units, Benson Portable Power Hoist, Victaulic Pipe Couplings & Fittings, Mobilift Forklift Trucks, New Wheatley 4″ & 6″ Gate Valves 500 WP. Write for listing—H. A. McCarthy, 310 Thompson Bldg., Tulsa, Oklahoma. 5-3296.

SULLIVAN 200, mounted on Mack tandem truck, 45 foot mast, 5 X 8 Gardner-Denver pump, Rig powered by two Industrial 12 Chrysler engines 140 hp. each, vee belt drives, automatic chuck, hydraulic pull down, 26 foot Kelly, swivel, hoses, breakout tongs, and many other tools including about 1000 feet of drill pipe. Rig had $8000.00 in new parts put in it recently. Excellent condition. $15,000.00. Now operating in eastern Nebraska. Omaha Drilling Co., 624 Service Life Bldg., Omaha, Nebraska.

UNUSED REFINERY EQUIPMENT

WORTHINGTON AIR EJECTORS—CONDENSERS

1—#16-NPA-12 Ejector, single element, single stage noncondensing.
1—#16-NPB Ejector, single element, with 60″ barometer precondenser and 30″ barometer after condenser.
2—#6-CPA Ejectors, 2 stage, noncondensing, single element.
1—#12-NPA-10 Ejector, single element, single stage noncondensing.
1—#10-NPA(B) Ejector, single element, single stage, with 30″ barometric after condenser.
1—#2½ CPA Sampling Ejector, standard, 2 stage noncondensing.

TERRY TURBINES

1—750 HP, type C-2, 1500 RPM
1—925 HP, type CS-1, 1500 RPM

CENTRIFUGAL PUMPS

2—Ingersoll-Rand, size 40, type APR Vertical pump, 17,500 GPM, 58′ head at 594 RPM
2—Ingersoll-Rand, size 32, type APR Vertical pump, 9,000 GPM, 58′ head at 744 RPM

RECIPROCATING PUMPS MFD. BY NATIONAL TRANSIT

2—6″ x 6″ x 18″
1—6″ x 7¼″ x 12″
2—6″ x 5″ x 12″
1—6″ x 4″ x 6″
1—5¼″ x 4¾″ x 5″
1—6″ x 4″ x 12″
1—10″ x 6″ x 12″

UNUSED VALVES

ELECTRIC MOTOR OPERATED

300# POWELL VALVES WITH PHILADELPHIA GEAR WORKS MOTOR UNIT—3/50/380 V.

8 only, 18″
20 only, 16″
35 only, 14″
16 only, 12″
10 only, 10″
23 only, 8″
7 only, 6″
12 only, 4″
8 only, 3″
SPARE PARTS—CONTROLS

EXPORT CRATED—IMMEDIATE DELIVERY

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DULIEN ENTERPRISES, INC.

40 EXCHANGE PLACE **NEW YORK 5, N. Y.**

Bowling Green 9-4160

FOR SALE
NEW OIL WELL CASING

Now offering the following sizes, subject to prior sale:

5½″—7″—8⅝″—9⅝″

Box D-978, The Oil and Gas Journal
Tulsa, Oklahoma

PIPE LINE EQUIPMENT FOR SALE

1—Buckeye Wheel Trencher, Model #12. Just rebuilt. Buda Gasoline Motor.
1—Buckeye Wheel Trencher, Model #12. A1 condition. Caterpillar Diesel Motor.
1—TD14 Angledozer. Rebuilt. Good Condition. With Tail Winch.
Various 200 and 300 Amp Gasoline driven welding machines.

Harford Brothers Construction Co.
Post Office Box 191, Emporium, Pa.

FOR SALE
Cast Iron Pipe

Quantity	Size	B & S	Class
2,000′	24″	do	150
1,500′	18″	do	200
2,160′	14″	do	200
454′	12″	do	200
288′	10″	do	200
625′	8″	P.E.	150
123′	8″	FLG	150
351′	6″	P.E.	150

400 Tons
Cast Iron Valves & Fittings

Steel Pipe
5,700′—26″ O. C. x .312 Wall
85.55 16 Ft.—D.R.L.

Write—Wire—Phone

Brown-Strauss Corp.
1546 Guinotte, Kansas City 10, Mo.
Phone: HA. 1000

EQUIPMENT FOR SALE

FOR SALE: At Barnsdall, Oklahoma, 1—Used 10" x 4½" x 10" Chicago Pneumatic belt driven compressor 500# operating pressure, 275,000 CFD. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Three Model 1879 used Buda engines at bargain prices. Worth your investigation for parts or rebuild. Carson Machine & Supply Co., Oklahoma City, Oklahoma. Phone 6-1511.

FOR SALE

Oilfield instrument and equipment company. Includes all property, equipment, office furniture, and business. Full price $18,500.00. Grossed $15,000.00 1950. Box 2328, Odessa, Texas.

EQUIPMENT FOR SALE

EVERYTHING in Cable Drilling Tools, Rigs—Belts—Tanks—Engines. 25 Complete strings heavy tools. Tri State Tool & Supply Co., Box 827, Phone 7-5121, Parkersburg, W. Va.

A REBUILT Keystone Spudder, trailer mounted, truck and tools. J. M. Berry, 239 South Pine, Phone 996, Nowata, Oklahoma.

FOR SALE
SEAMLESS OIL WELL CASING

4,000' of 7" OD Seamless Casing, 8 Round Thread, Range 2.
2,000' of 8⅝" OD 24# Seamless Casing, 8 Round Thread, Range 1 & 2.
1,000' of 10¾" OD 32¾# Seamless Steel Casing.
600' of 13⅜" OD 48# Seamless Steel Casing.
Above casing was bought new last year

NORRIS-MADISON SUPPLY CO.
Glasgow, Ky. Phone 406

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND MAN WANTS "TICKET" FOR WILLISTON OR DENVER BASIN.
Phone Denver, Tabor 7361, or
Box 997, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER—achievement record engineering, construction, operating, sales with industry's big oil and engineering companies. Proven administrative and technical ability as former Project Engineer, Plant Superintendent, Equipment Engineer. Age 36. Located N. Y. C. Seeking active opportunity paying $9,000 minimum. Box D-999, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT AVAILABLE
25 YEARS' EXPERIENCE
GRADUATE PETROLEUM ENGINEER
Box E-103
The Oil and Gas Journal, Tulsa, Oklahoma

GEOLOGIST, now operating as an independent, would like to become associated with operator or group in need of an experienced man, on a salary-interest basis. Have been associated with the oil industry better than fifteen years in geological and geophysical exploration, development, leasing, and other phases of operation. Capable of directing operations and passing on submittals made. Salary of minor importance. Interview can be arranged. Box E-105, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Nine years exceptional experience, Texas and Mid-Continent subsurface & evaluation. Two degrees, draft-exempt, transferable. Excellent references. Desire position with future, suitable salary. If interested, detail position, salary, location. Box E-107, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST now with major company and 17 years experience in West Texas, Oklahoma, Texas Gulf Coast, Florida and South America desires change. All phases subsurface and well work. Supervisory experience. Box E-106, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTABLISHED Factory Representative covering North and East Texas desires additional lines, applicable oil, industrial, sold thru supply stores. Write—Box 316, Crockett, Texas.

SALES ENGINEER—Manufacturer's representative. Sixteen years experience in technical sales and contract negotiation. Graduate engineer, age 40. Box D-984, The Oil and Gas Journal, Tulsa, Oklahoma.

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Drawer 2650 **Tulsa, Okla.**

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WANTED: PORTABLE ROTARY
Complete, fair condition, 4,000' Cap. Box 198, Gorham, Kansas.

WANTED: Good used well drilling equipment. Spudders, rotaries, large or small. Tools and general equipment. We distribute throughout the West with hundreds of customers. Pressey & Son, Pueblo, Colorado.

OCS GREYHOUND Chain Driven Sand Reel, Heavy Cable Tool Rigs; Side Door Elevators; Control Heads, Spudders, Skid Type Pulling Units. McGinnis, Tri State Gas, Box 827, Parkersburg, W. Va.

WANTED: Spudder complete with all tools, capable drilling 3000 feet. Give price, type, conditions and location: Box D-982, The Oil and Gas Journal, Tulsa, Oklahoma.

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10,000 gallon to 80,000 barrel—any quantity or location

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Cincinnati 2, Ohio

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PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

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FOR SALE: Attractive Ranch-type Cottage on beautiful Lake Pelican, Minnesota. Completely modernized. Near Senator Kerr's Cottage. Write J. J. Thomas—Seward, Nebraska.

BUSINESS OPPORTUNITIES

INVESTMENT OPPORTUNITIES: Wish to contact parties to finance oil drilling deals. Excellent opportunity to invest tax money. Box E-102, The Oil and Gas Journal, Tulsa, Oklahoma.

FIFTY-YEAR established wholesale type printing business expanding volume wants $8000 one year with option renewal part. Machinery collateral quick sale value $35,000. Gibson, Box 1646, Houston.

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WANTED: Young man with Crude Oil Purchasing experience — Gulf Coast Area preferred. Please give education, experience and salary expected in first letter. Box D-987, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION Superintendent: Must be experience in Industrial Construction including Chemical and Refinery Plants. Good opportunity and future in well established small company. In applying state education, experience, family status and salary expected. Work is in the Houston area. Box D-988, The Oil and Gas Journal, Tulsa, Oklahoma.

NATURAL Gas Company located in northwest has opening for recent graduate in natural gas or petroleum engineering for general engineering work in gas utility. Prefer individual with two or three years' experience but will consider recent graduate. Replies confidential. Box D-1000, The Oil and Gas Journal, Tulsa, Oklahoma.

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Expanding, integrated, independent oil company has opening for Geophysicist. College graduate with six to eight years geophysical work. Five years as Party Chief or Supervisor. Interesting employe benefits, good salary for qualified applicant. Our employes know of this opening. All Applications held in strictest confidence. Write Personnel Division, P. O. Box 1051, Tulsa, Oklahoma.

WANTED:

Exploratory Geologist familiar with and preferably now residing in Southern Oklahoma. Must be aggressive and experienced. Fine opportunity with progressive Independent.

Box D-967, The Oil and Gas Journal Tulsa, Oklahoma

HELP WANTED

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00 Oil Industry Mailing List, Box 2003, Tulsa, Okla.

NATURAL Gas Pipe Line Company located in northwest has opening for gas measurement engineer or accountant, age under forty, for general supervision of gas measurement and accounting for pipe line system. Replies confidential. Box E-100, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

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EXPERIENCED TITLE MAN for lease records division major oil company. Give age, experience, education, military status and salary expected. Reply Box D-998, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND MAN: Experienced land man for major company operating in Mid-Continent areas. Ages 30 to 45. Excellent possibilities. Replies confidential. Box D-990, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED: Sales Engineers and Service Engineers for large industrial instrument manufacturer. Prefer Mechanical, Electrical or Chemical Engineers with few years industrial experience. Fine opportunity for young engineers with sales or service aptitudes to connect with one of the fastest growing industrial instrument companies in the United States. Locations: Seattle, Washington; Detroit, Michigan; Charlotte, N. C.; and New York City. In addition to above we desire services of two Sales Engineers who will be located at our factory for an indefinite period of time but will eventually be placed in large industrial cities of the United States. For the latter positions we desire men who will be flexible in regard to transfers. Exceptional opportunities for these two men who are willing to be sent on assignment anywhere in the United States. Box D-991, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Sales representative by old established pumping equipment manufacturer, liberal commission basis. Desirable territories open, all replies confidential. Box D-986, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

PRIVATE PARTY wants to invest up to $150,000.00 in producing royalties or settled production. Small or large deals considered. Box D-912, The Oil and Gas Journal, Tulsa, Oklahoma.

WE will buy producing or non-producing oil royalties. Standard Security Company, 115 Broadway, New York 6.

LEASE AND DRILLING BLOCKS

2000 FEET 5½-inch 15.5 lbs. per foot J-55 oil casing available for interest in producing well. Box D-980, The Oil and Gas Journal, Tulsa, Oklahoma.

FINANCIAL help wanted to drill hundred sixty 6 possible producing formations; will sell three-quarters based on three hundred dollars per thirty-second if Oil or Gas will complete if dry will return half your money. O. A. Sewell, Coweta, Oklahoma.

94-ACRE repressure tract. 20′ Bartlesville sand at 1250′ depth. Montgomery County, Kansas. Deep Rock on two sides. Also have one location tract in Bartlesville sand farewa, Greenwood County, Kansas. An excellent location. H. C. Lynch, 3236 E. Murdock Ave., Wichita 6, Kansas.

OIL TESTING CHEMIST

Man between 30 and 40 years old, with experience in all ASTM petroleum tests, to deal with design and promotion of leading line of testing apparatus in this field.

Must have mechanical ingenuity and initiative. In replying, give full details of education and experience, and submit recent snapshot.

Box D-989

The Oil and Gas Journal, Tulsa, Oklahoma

WANTED:

OFFICE MANAGER with LAND DEPARTMENT EXPERIENCE

Medium sized aggressive independent oil producing company long established in Oklahoma desires to employ a Manager for its Oklahoma Division, with headquarters in Oklahoma City. Position requires an alert individual experienced in land and leasing work who has a good sense of land values. Producing operations are not handled by this office. Competent geological staff now employed and can be expanded in keeping with the activity of the office.

Beginning salary is open. Advancement in salary assured to person who can produce. Replies will be kept strictly confidential and no inquiries will be made concerning applicant without first receiving applicant's consent. Replies to this inquiry should contain a historical outline of past experience and information as to present salary and proposed starting salary.

Address Box E-104, The Oil and Gas Journal, Tulsa, Oklahoma

NEW MEXICO OILFIELDS

We have prepared data of vital interest to royalty & lease buyers covering important oilfield in Roosevelt County & potential fields in Chaves & DeBacca Counties. Also a semiproven drilling operation. Details on request.

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Portales, New Mexico

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Phones: 2-8691; 3-1531

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Producing and Nonproducing Bought and Sold—Any Area Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

KANSAS OIL DEALS WANTED: Reputable independent operator and producer solicits your drilling deals. Box D-974. The Oil and Gas Journal, Tulsa, Oklahoma.

PLANNING to develop a partly proven oil-gas field in Allegany County, N. Y. Interest may be had for cash or good used casing, drive pipe and well equipment. If interested, write for details. C. N. Wilber, Box 625, Westfield, Pa.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases. Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

FOR SALE: West Texas drilling deals, proven and wildcat. We buy Texas production and producing royalties. Navarro Royalties Company, Box 2626, Telephone 6439, Odessa, Texas.

OIL DEALS WANTED

By independent operator. If you have a deal that has a good chance of producing, write us at once, describing fully. P. O. Box 2071, Tulsa.

SHALLOW LEASE in Eastern Kansas with one well and flowing part time with #5½ Keystone drilling machine complete. Very reasonable. Box 198, Gorham, Kansas.

NOTICES

EDWARD M. CAMPBELL
Attorney-at-Law
announces the opening of a law office at Farmington, New Mexico. Address: 315 West Main, Phone 158-W.
Oil and Gas Specialist
Tax Consultant

MID-VALLEY PIPE LINE CO.
LONGVIEW, TEXAS

Will issue specifications and drawings May 15 and receive bids until June 15th covering building of six complete 5,000 HP Oil Line Pump Stations and extending and adding to seven existing similar stations. Contractors interested in receiving specifications and drawings contact: J. D. Ward, Purchasing Agent, Longview, Texas, prior to May 10, 1951. Copies of drawings and specifications may be obtained by making a deposit of $25.00 which sum will be refunded upon return in good condition of the complete documents within ten days after receipt of same or if used in submitting a bona-fide proposal.

Braden Holds General Sales Conference

Braden Steel Corp., Tulsa, held their general sales conference April 19-20 at Ginger Blue Lodge near Noel, Mo.

W. D. Moorer, president, stated that the meeting was attended by all Braden district managers, salesmen from the branch offices in Houston, Memphis, Shreveport, and Denver, and all department heads and sales force from Tulsa.

Among the guests attending the conference were: Robert C. Friedley, Nelson Stud Welding; R. W. Davison, Sheffield Steel Corp.; Leonard C. Barr, Nelson Stud Welding; R. F. Naylor, Crittall, Inc.; Orville A. Howe, Young Roofing Co.; E. J. Liggett, Johns-Manville Sales Corp.; and Kenneth Beer, Corrulux Corp.

All sessions of the conference were under the direction of Moorer and J. C. Pharr, executive vice president and general manager.

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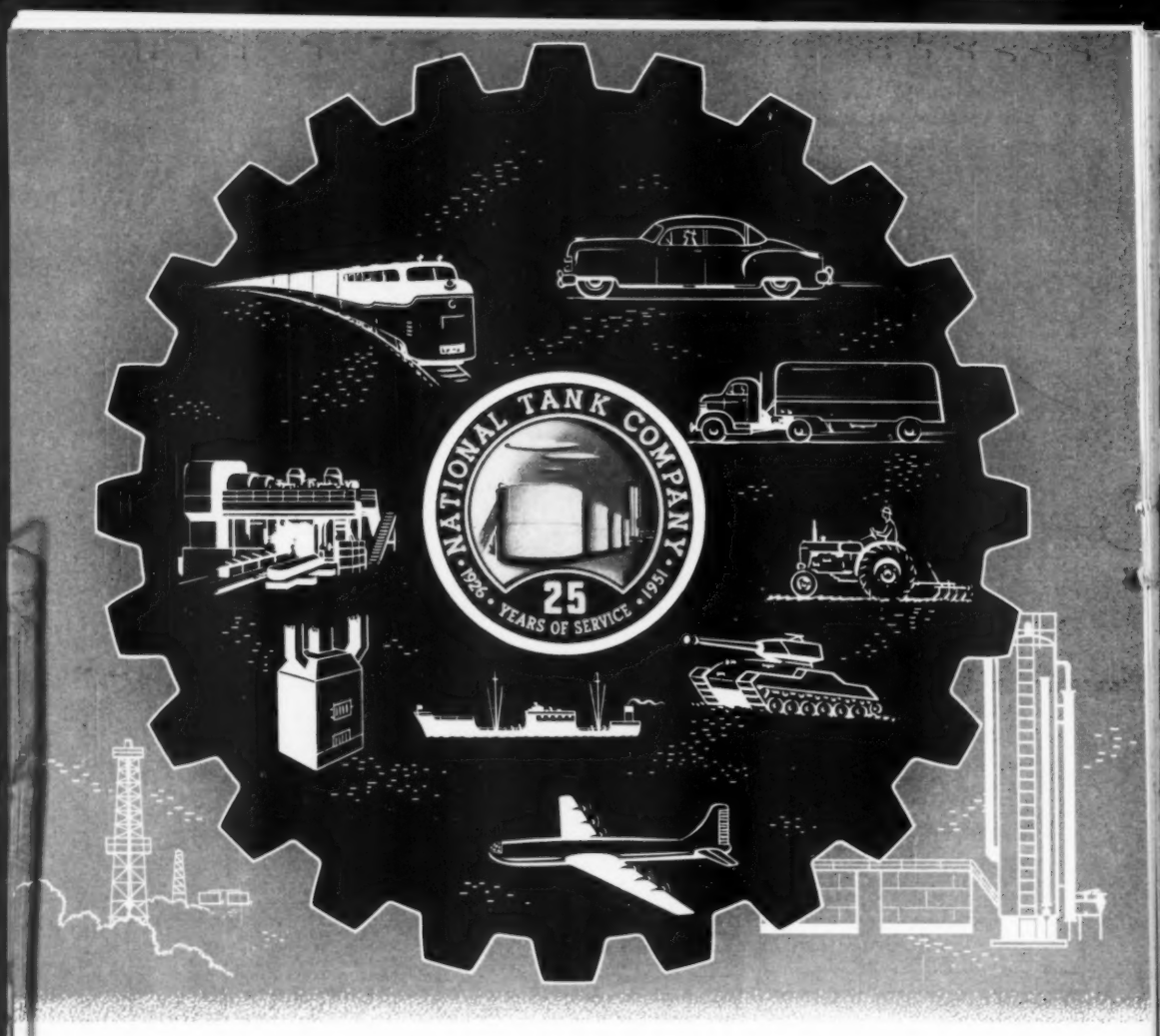

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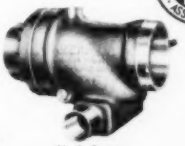
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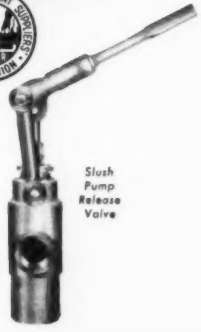
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